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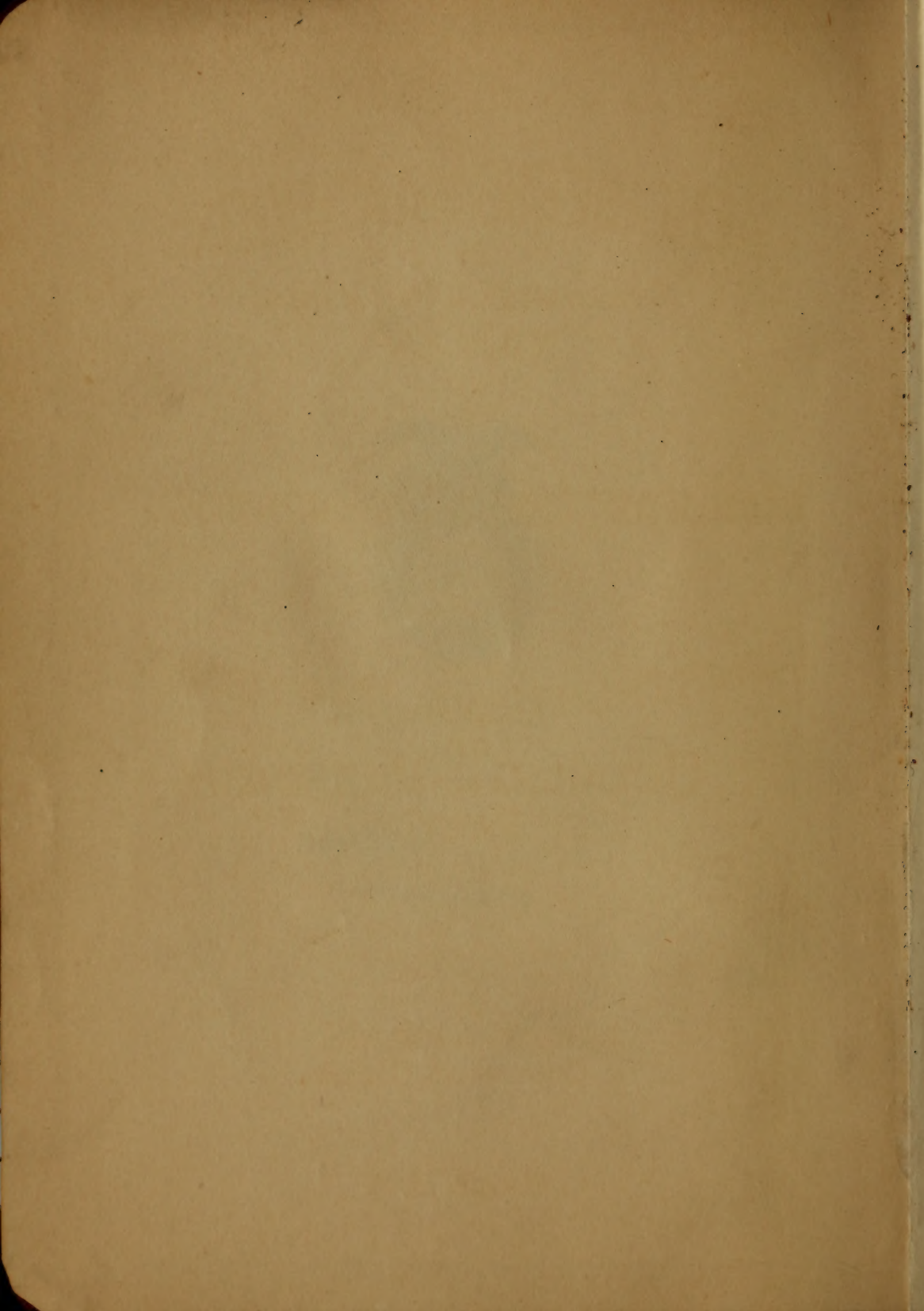
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# ENGINEERS HANDBOOK OF STANDARD AND PRACTICAL TABLES

MANUFACTURERS STANDARDS,



AND  
CONSTRUCTIONAL DIMENSIONS  
OF  
DETAILS AND MACHINERY.  
PART 1.

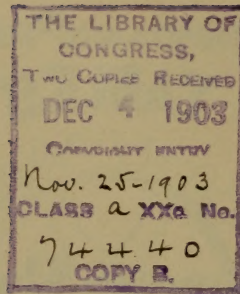
COMPILED, WRITTEN

BY

M. NEUMAYER, M.E.  
CINCINNATI, O. U.S.A.

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## PREFACE.

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STANDARD TABLES, MANUFACTURERS' STANDARDS AND CONSTRUCTIONAL DIMENSIONS OF DETAILS are of the greatest importance to those engaged in DESIGNING, CONSTRUCTING AND HANDLING MACHINERY AND ESTIMATING ON PLANS AND MOTIVE POWERS.

In compiling these tables, the vital question, so well known to DRAFTSMEN, ENGINEERS, MECHANICS, and all those connected with the MECHANICAL TRADES, namely: "WHAT TO BUILD AND HOW TO BUILD IT STRONG ENOUGH," has received my careful consideration, and by consulting these tables, much of the FIGURING, SO MUCH DREADED by busy men, will be saved.

It is my sincere wish that this book may prove a satisfactory and beneficial AID TO ENGINEERS OF EVERY CLASS, and I will cheerfully explain and give advice in regards to any part that may seem abstruse. ERRORS, that are pointed out to me, will be thankfully received, and CORRECTED.

I am also prepared to furnish complete DRAWINGS, TRACINGS, AND BLUEPRINTS OF DETAILS AND MACHINERY, as well as PATTERNS and the MACHINE-FINISHED PARTS corresponding to the DIMENSIONS given in the TABLES.

In connection with this I wish to express my gratitude to the following gentlemen and firms for their kind assistance:

F. F. Nickel, Esq., M. E. ....	Brooklyn, N. Y.
Cambria Steel Co. ....	Johnstown, Pa.
Carnegie Steel Co. ....	Pittsburg, Pa.
Morse, Williams & Co. ....	Philadelphia, Pa.
H. W. Caldwell & Son Co. ....	Chicago, Ill.
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John S. Roebling's Sons Co. ....	Trenton, N. J.



Standard Gauge Steel Co.....	Beaverfalls, Pa.
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Link Belt Engineering Co.....	Philadelphia, Pa.
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Crane Co.....	Chicago, Ill.
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George Cutter, Esq.....	Chicago, Ill.
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American Electrical Works.....	Providence, R. I.
The Brown Hoisting Machinery Co.....	Cleveland, O.
The New Process Rawhide Co.....	Syracuse, N. Y.
Oneida Community, Ltd.....	Kenwood, N. Y.
Federal Manufacturing Co.....	Indianapolis, Ind.

Very truly yours,

*H. Neumayer*

CINCINNATI, September, 1903.



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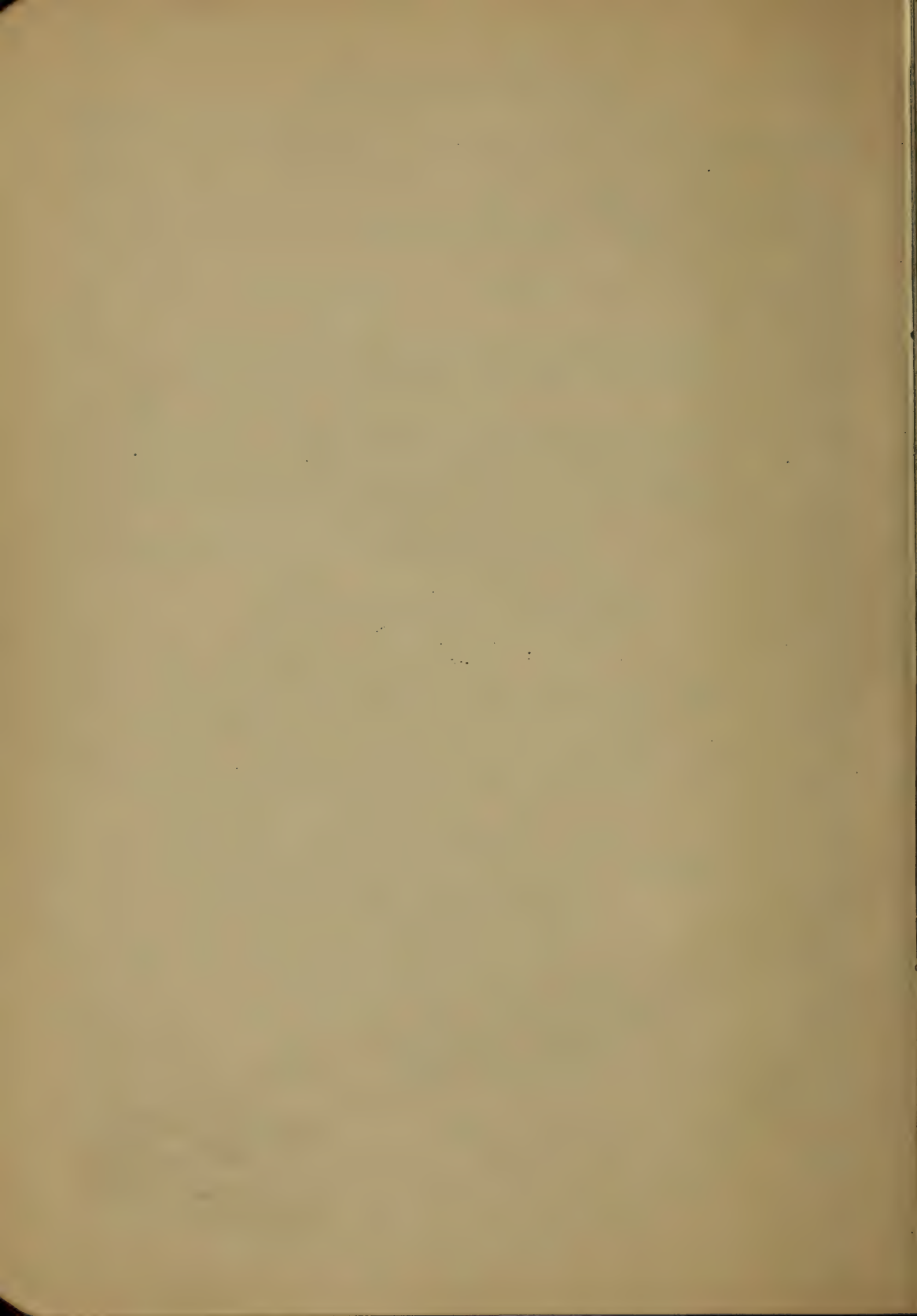
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### DIAMETERS, CIRCUMFERENCES & AREAS OF CIRCLES.

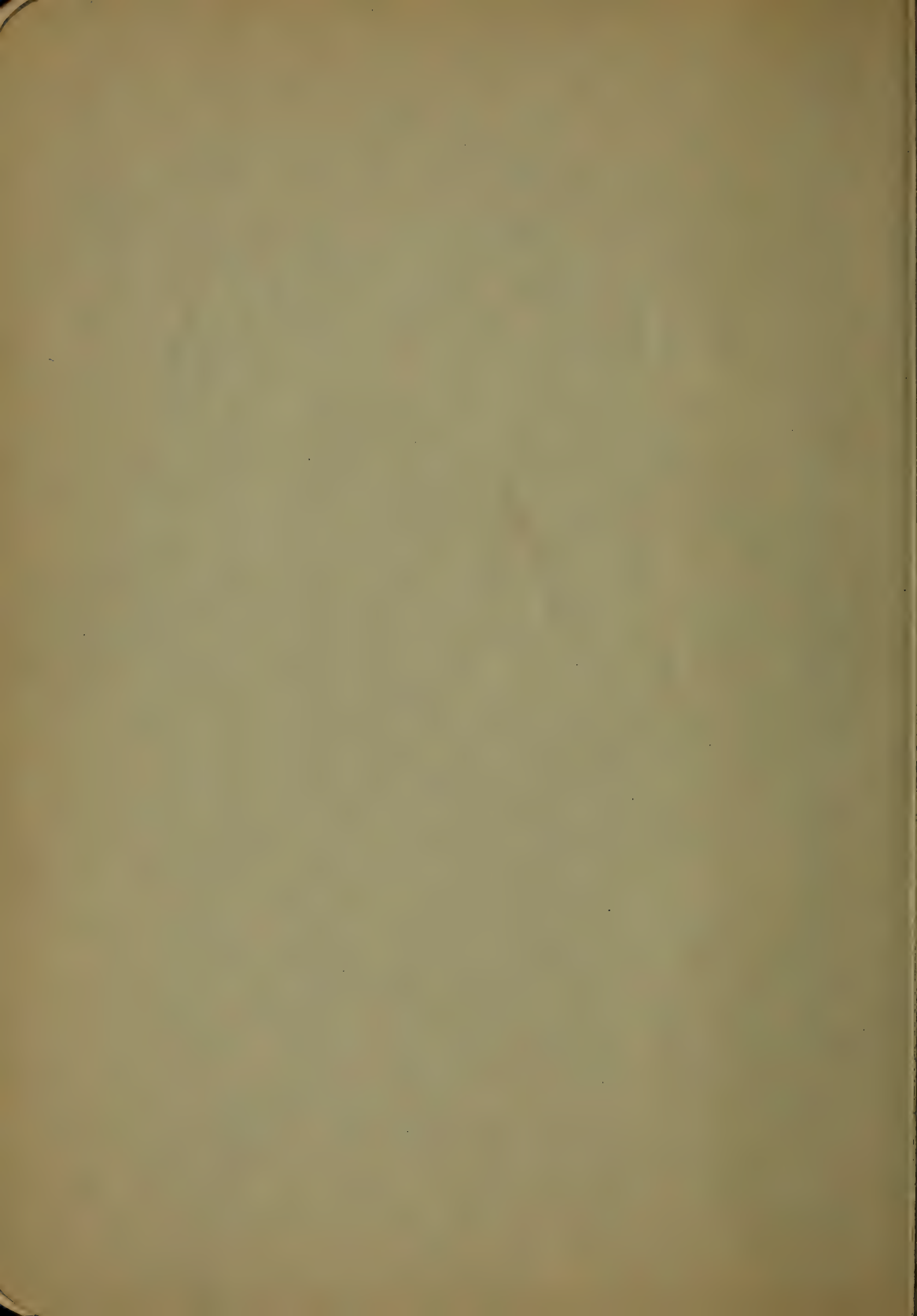
FROM 1/10" TO 100". ADVANCING BY TENTHS.

N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	LOG N	1000 $\cdot \frac{1}{N}$	LN. N	D	$\pi D$	$\frac{\pi D^2}{4}$
1	1	1	1.000	1.000	.0000	1000.00	.0000	.1	3.142	.007854
2	4	8	1.4142	1.2599	.30103	500.00	.6931	.2	.6283	.031416
3	9	27	1.7321	1.4422	.47712	333.333	1.0986	.3	.9425	.070686
4	16	64	2.000	1.5874	.60206	250.00	1.3863	.4	1.2566	.125664
5	25	125	2.2361	1.7100	.69897	200.00	1.6094	.5	1.5708	.19635
6	36	216	2.4495	1.8171	.77815	166.667	1.7918	.6	1.8850	.28274
7	49	343	2.6458	1.9129	.84510	142.857	1.9459	.7	2.1991	.38485
8	64	512	2.8284	2.000	.90309	125.000	2.0794	.8	2.5133	.50265
9	81	729	3.000	2.0801	.95424	111.111	2.1972	.9	2.8274	.63617
10	100	1000	3.1623	2.1544	1.00000	100.000	2.3026	1.0	3.1416	.7854
11	121	1331	3.3166	2.2204	1.04139	90.9091	2.3979	1.1	3.4558	.95032
12	144	1728	3.4641	2.2894	1.07918	83.333	2.4849	1.2	3.7699	1.1310
13	169	2197	3.6056	2.3615	1.11394	76.9231	2.5743	1.3	4.0841	1.3273
14	196	2744	3.7417	2.4361	1.14613	71.4286	2.6561	1.4	4.3982	1.5393
15	225	3375	3.8730	2.4942	1.17609	66.6667	2.7381	1.5	4.7124	1.7673
16	256	4096	4.000	2.5198	1.20412	62.500	2.7724	1.6	5.0265	2.0106
17	289	4913	4.1231	2.5775	1.23045	58.8235	2.8382	1.7	5.3407	2.2698
18	324	5832	4.2426	2.6267	1.25527	55.5556	2.8904	1.8	5.6549	2.5447
19	361	6859	4.3589	2.6684	1.27875	52.6316	2.9444	1.9	5.9690	2.8355
20	400	8000	4.4721	2.7144	1.30103	50.000	2.9957	2.0	6.2832	3.1416
21	441	9261	4.5826	2.7539	1.32221	47.6190	3.0445	2.1	6.5973	3.4636
22	484	10648	4.6904	2.7970	1.34234	45.4545	3.0910	2.2	6.9115	3.8015
23	529	12167	4.7960	2.8439	1.36137	43.4783	3.1355	2.3	7.2257	4.1547
24	576	13824	4.8990	2.8945	1.37931	41.6667	3.1781	2.4	7.5398	4.5239
25	625	15625	5.000	2.9440	1.39613	40.000	3.2189	2.5	7.8540	4.9087
26	676	17576	5.0990	2.9927	1.41187	38.4615	3.2581	2.6	8.1681	5.2992
27	729	19683	5.1962	3.0404	1.42654	37.0370	3.2958	2.7	8.4823	5.7057
28	784	21952	5.2915	3.0866	1.44016	35.7143	3.3322	2.8	8.7964	6.1275
29	841	24389	5.3852	3.1315	1.45272	34.4828	3.3673	2.9	9.1105	6.5652
30	900	27000	5.4772	3.1752	1.46521	33.333	3.4012	3.0	9.4246	7.0184
31	961	29791	5.5678	3.2178	1.47663	32.2581	3.4340	3.1	9.7387	7.4877
32	1024	32768	5.6569	3.2595	1.48698	31.2500	3.4658	3.2	10.0528	7.9728
33	1089	35937	5.7446	3.3003	1.49727	30.3030	3.4965	3.3	10.3669	8.4739
34	1156	39476	5.8310	3.3403	1.50751	29.4118	3.5264	3.4	10.6810	8.9902
35	1225	42375	5.9161	3.3797	1.51769	28.5714	3.5553	3.5	10.9951	9.5218
36	1296	45656	6.000	3.4189	1.52782	27.7778	3.5835	3.6	11.3092	10.0688
37	1369	50353	6.0826	3.4572	1.53789	27.0270	3.6109	3.7	11.6233	10.6312
38	1444	54872	6.1634	3.4948	1.54791	26.3158	3.6376	3.8	11.9374	11.2091
39	1521	59719	6.2430	3.5312	1.55788	25.6410	3.6636	3.9	12.2515	11.8025
40	1600	64800	6.3214	3.5668	1.56780	25.000	3.6889	4.0	12.5656	12.5664



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	$1000 - \frac{1}{N}$	Ln. N	D	$\pi D$	$\pi \frac{D^2}{4}$
41	1681	68921	6.4031	3.4462	1.61278	24.5902	3.7136	4.1	12.841	13.0625
42	1764	74088	6.4807	3.4780	1.62345	23.8095	3.7377	4.2	13.195	13.8544
43	1849	79507	6.5574	3.5094	1.63347	23.2558	3.7612	4.3	13.509	14.5810
44	1936	85184	6.6332	3.5393	1.64245	22.7273	3.7842	4.4	13.813	15.2653
45	2025	91125	6.7082	3.5687	1.65128	22.2222	3.8067	4.5	14.125	15.9143
46	2116	97336	6.7824	3.5976	1.66000	21.7391	3.8286	4.6	14.451	16.5490
47	2209	103823	6.8557	3.6260	1.66861	21.2746	3.8501	4.7	14.765	17.1694
48	2304	110592	6.9282	3.6542	1.67714	20.8333	3.8712	4.8	15.080	17.7756
49	2401	117649	7.0000	3.6821	1.68560	20.4082	3.8918	4.9	15.394	18.3674
50	2500	125000	7.0711	3.7098	1.69397	20.0000	3.9120	5.0	15.708	19.4350
51	2601	132651	7.1414	3.7384	1.70227	19.6076	3.9318	5.1	16.022	20.4262
52	2704	140608	7.2111	3.7665	1.71050	19.2306	3.9512	5.2	16.336	21.2372
53	2809	148877	7.2801	3.7953	1.71866	18.8679	3.9703	5.3	16.650	22.0618
54	2916	157464	7.3483	3.7798	1.72675	18.5185	3.9890	5.4	16.965	22.9099
55	3025	166375	7.4162	3.8050	1.73478	18.1818	4.0073	5.5	17.279	23.7803
56	3136	175616	7.4833	3.8299	1.74275	17.8571	4.0254	5.6	17.593	24.6801
57	3249	185193	7.5498	3.8543	1.75067	17.5439	4.0431	5.7	17.907	25.5906
58	3364	195112	7.6158	3.8790	1.75853	17.2414	4.0604	5.8	18.221	26.4208
59	3481	205373	7.6811	3.8996	1.76635	16.9492	4.0775	5.9	18.535	27.2797
60	3600	216000	7.7460	3.9193	1.77411	16.6667	4.0943	6.0	18.850	28.2743
61	3721	226981	7.8102	3.9385	1.78182	16.3934	4.1109	6.1	19.164	29.2997
62	3844	238328	7.8740	3.9579	1.78947	16.1290	4.1271	6.2	19.478	30.3597
63	3969	250047	7.9373	3.9771	1.79707	15.8730	4.1431	6.3	19.792	31.4465
64	4096	262144	8.0000	4.0000	1.80461	15.6250	4.1589	6.4	20.106	32.5699
65	4225	274625	8.0623	4.0207	1.81211	15.3846	4.1744	6.5	20.420	33.7231
66	4356	287496	8.1240	4.0412	1.81954	15.1515	4.1897	6.6	20.735	34.9119
67	4489	300763	8.1854	4.0615	1.82691	14.9244	4.2047	6.7	21.049	36.1306
68	4624	314432	8.2462	4.0817	1.83421	14.7039	4.2195	6.8	21.363	37.3846
69	4761	328509	8.3064	4.1016	1.84145	14.4892	4.2341	6.9	21.677	38.6698
70	4900	343000	8.3661	4.1213	1.84864	14.2807	4.2485	7.0	21.991	39.9908
71	5041	357911	8.4251	4.1408	1.85578	14.0784	4.2627	7.1	22.305	41.3519
72	5184	373248	8.4833	4.1602	1.86287	13.8829	4.2767	7.2	22.619	42.7550
73	5329	389017	8.5409	4.1793	1.86991	13.6934	4.2905	7.3	22.934	44.2039
74	5476	405224	8.6000	4.1983	1.87691	13.5098	4.3041	7.4	23.248	45.6984
75	5625	421875	8.6583	4.2172	1.88386	13.3333	4.3175	7.5	23.563	47.2384
76	5776	438976	8.7162	4.2358	1.89077	13.1627	4.3307	7.6	23.877	48.8246
77	5929	456533	8.7736	4.2543	1.89764	12.9980	4.3438	7.7	24.191	49.4563
78	6084	474552	8.8308	4.2727	1.90447	12.8392	4.3567	7.8	24.505	50.1346
79	6241	493039	8.8878	4.2909	1.91126	12.6862	4.3694	7.9	24.819	50.8597
80	6400	512000	8.9443	4.3089	1.91801	12.5390	4.3820	8.0	25.133	51.6325
81	6561	531441	9.0000	4.3267	1.92472	12.3977	4.3944	8.1	25.447	52.4530
82	6724	551368	9.0549	4.3444	1.93139	12.2621	4.4067	8.2	25.761	53.3102
83	6889	571787	9.1096	4.3621	1.93802	12.1322	4.4188	8.3	26.075	54.2051
84	7056	592704	9.1640	4.3797	1.94461	11.9980	4.4308	8.4	26.389	55.1377
85	7225	614125	9.2182	4.3972	1.95116	11.8694	4.4427	8.5	26.703	56.1089
86	7396	636054	9.2722	4.4146	1.95767	11.7464	4.4543	8.6	27.017	57.1188
87	7569	658493	9.3259	4.4319	1.96415	11.6290	4.4659	8.7	27.331	58.1674
88	7744	681448	9.3794	4.4491	1.97059	11.5172	4.4773	8.8	27.645	59.2546
89	7921	704929	9.4326	4.4662	1.97700	11.4110	4.4886	8.9	27.959	60.3804
90	8100	728940	9.4856	4.4832	1.98338	11.3103	4.4998	9.0	28.273	61.5447
91	8281	753481	9.5384	4.4999	1.98973	11.2150	4.5109	9.1	28.587	62.7476
92	8464	778568	9.5911	4.5164	1.99605	11.1250	4.5218	9.2	28.901	63.9890



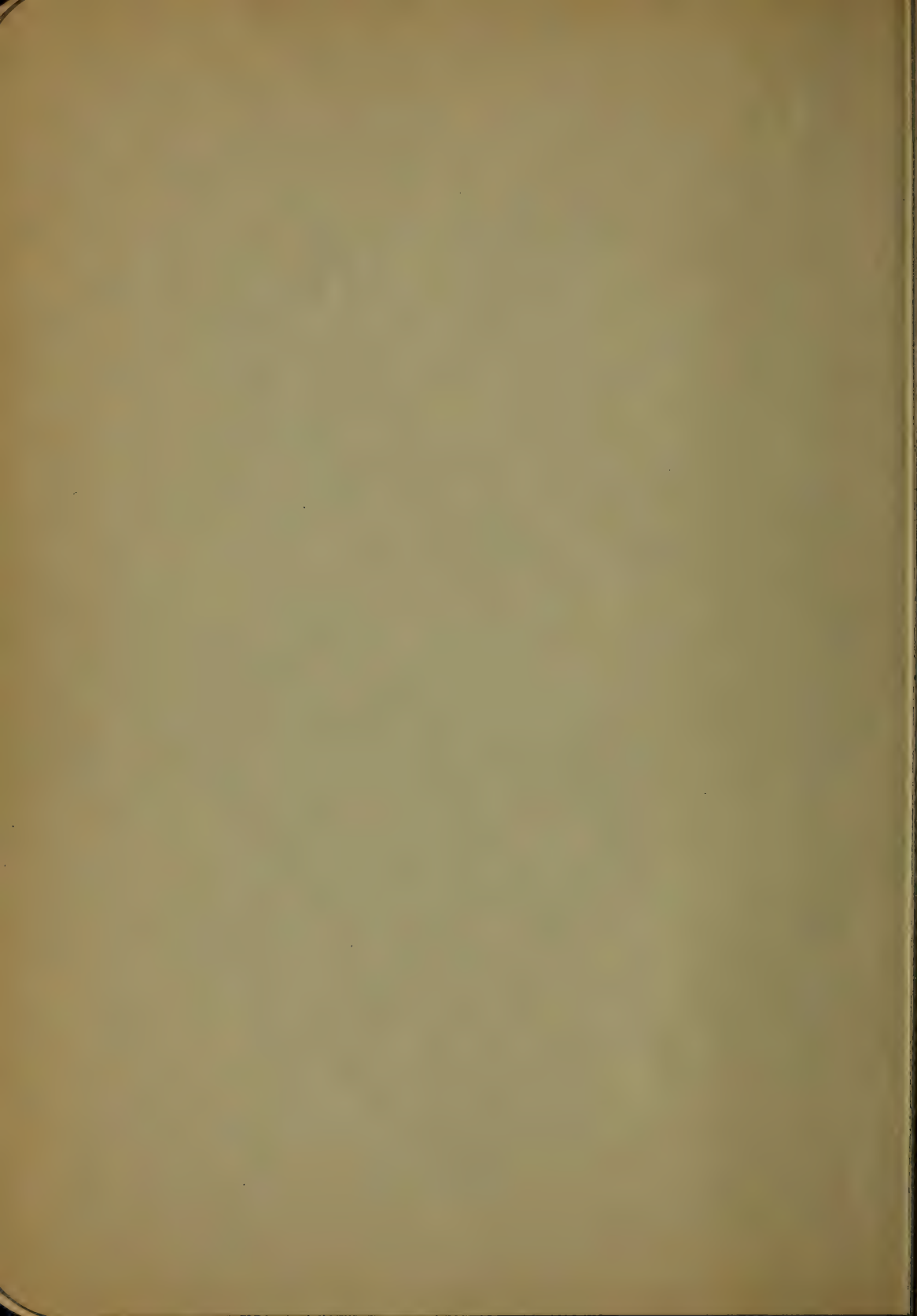




N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	LOG. N	1000. $\frac{1}{N}$	LN. N	D	$\pi D$	$\pi \frac{D^2}{4}$
93	8649	804357	9.6437	4.5307	1.96848	10.7527	4.5326	9.3	29.217	87.929
94	8836	830584	9.6954	4.5468	1.97313	10.6383	4.5433	9.4	29.531	89.398
95	9025	857375	9.7468	4.5629	1.97772	10.5263	4.5539	9.5	29.845	90.882
96	9216	884736	9.7980	4.5789	1.98227	10.4167	4.5643	9.6	30.159	92.382
97	9409	912673	9.8489	4.5947	1.98677	10.3093	4.5747	9.7	30.473	93.898
98	9604	941192	9.8995	4.6104	1.99123	10.2041	4.5850	9.8	30.788	95.429
99	9801	970299	9.9499	4.6261	1.99564	10.1010	4.5951	9.9	31.102	96.978
100	10000	1000000	10.000	4.6416	2.0000	10.000	4.6052	10.0	31.416	78.540
101	10201	1030301	10.0499	4.6570	2.00432	9.90099	4.6151	10.1	31.730	80.118
102	10404	1061208	10.0995	4.6723	2.00860	9.80892	4.6250	10.2	32.044	81.713
103	10609	1092727	10.1499	4.6875	2.01284	9.70874	4.6347	10.3	32.358	83.323
104	10816	1124864	10.1980	4.7027	2.01703	9.61538	4.6444	10.4	32.673	84.948
105	11025	1157625	10.2470	4.7177	2.02119	9.52381	4.6540	10.5	32.987	86.590
106	11236	1191016	10.2956	4.7326	2.02531	9.43396	4.6634	10.6	33.301	88.247
107	11449	1225043	10.3441	4.7475	2.02938	9.34579	4.6728	10.7	33.615	89.920
108	11664	1259712	10.3923	4.7622	2.03342	9.25926	4.6821	10.8	33.929	91.608
109	11881	1295029	10.4403	4.7769	2.03743	9.17431	4.6913	10.9	34.243	93.313
110	12100	1331000	10.4881	4.7914	2.04139	9.09091	4.7005	11.0	34.558	95.033
111	12321	1367631	10.5357	4.8059	2.04532	9.00901	4.7095	11.1	34.872	96.769
112	12544	1404928	10.5830	4.8203	2.04922	8.92857	4.7185	11.2	35.186	98.520
113	12769	1442897	10.6301	4.8346	2.05308	8.84956	4.7274	11.3	35.500	100.287
114	12996	1481544	10.6771	4.8488	2.05690	8.77193	4.7362	11.4	35.814	102.07
115	13225	1520875	10.7238	4.8629	2.06070	8.69565	4.7449	11.5	36.128	103.869
116	13456	1560896	10.7703	4.8770	2.06446	8.62069	4.7536	11.6	36.442	105.683
117	13689	1601613	10.8167	4.8910	2.06819	8.54701	4.7622	11.7	36.757	107.513
118	13924	1643032	10.8628	4.9049	2.07188	8.47452	4.7707	11.8	37.071	109.359
119	14161	1685159	10.9087	4.9187	2.07553	8.40324	4.7791	11.9	37.386	111.220
120	14400	1728000	10.9545	4.9324	2.07918	8.33333	4.7875	12.0	37.699	113.097
121	14641	1771561	11.000	4.9461	2.08279	8.26446	4.7958	12.1	38.013	114.99
122	14884	1815848	11.0454	4.9597	2.08636	8.19672	4.8040	12.2	38.327	116.899
123	15129	1860867	11.0905	4.9732	2.08991	8.13008	4.8122	12.3	38.642	118.823
124	15376	1906624	11.1355	4.9866	2.09342	8.06452	4.8203	12.4	38.956	120.763
125	15625	1953125	11.1803	5.0000	2.09691	8.00000	4.8283	12.5	39.270	122.718
126	15876	2000376	11.2250	5.0133	2.10037	7.93651	4.8363	12.6	39.584	124.690
127	16129	2048383	11.2694	5.0265	2.10380	7.87402	4.8442	12.7	39.898	126.677
128	16384	2097152	11.3137	5.0397	2.10721	7.81250	4.8520	12.8	40.212	128.68
129	16641	2146689	11.3578	5.0528	2.11059	7.75194	4.8598	12.9	40.527	130.698
130	16900	2197000	11.4018	5.0658	2.11394	7.69231	4.8675	13.0	40.841	132.732
131	17161	2248091	11.4455	5.0788	2.11727	7.63359	4.8752	13.1	41.155	134.782
132	17424	2299968	11.4891	5.0916	2.12057	7.57576	4.8828	13.2	41.469	136.848
133	17689	2352637	11.5326	5.1045	2.12385	7.51880	4.8903	13.3	41.783	138.929
134	17956	2406104	11.5758	5.1172	2.12710	7.46269	4.8978	13.4	42.097	141.026
135	18225	2460375	11.6190	5.1299	2.13033	7.40741	4.9053	13.5	42.412	143.139
136	18496	2515456	11.6619	5.1424	2.13354	7.35294	4.9127	13.6	42.726	145.267
137	18769	2571353	11.7047	5.1551	2.13672	7.29927	4.9200	13.7	43.040	147.411
138	19044	2628072	11.7473	5.1676	2.13988	7.24638	4.9273	13.8	43.354	149.571
139	19321	2685619	11.7898	5.1801	2.14301	7.19424	4.9345	13.9	43.668	151.747
140	19600	2744000	11.8322	5.1925	2.14613	7.14286	4.9416	14.0	43.982	153.938
141	19881	2803221	11.8743	5.2048	2.14924	7.09214	4.9488	14.1	44.296	156.145
142	20164	2863288	11.9164	5.2171	2.15232	7.04225	4.9558	14.2	44.611	158.368
143	20449	2924207	11.9583	5.2293	2.15534	6.99301	4.9628	14.3	44.925	160.606
144	20736	2985984	12.000	5.2415	2.15836	6.94444	4.9698	14.4	45.239	162.860
145	21025	3048625	12.0416	5.2536	2.16137	6.89655	4.9767	14.5	45.553	165.130



$N$	$N^2$	$N^3$	$\sqrt{N}$	$\sqrt[3]{N}$	$\text{Log. } N$	$1000 \cdot \frac{1}{N}$	$\text{Ln. } N$	$D$	$\pi D$	$\pi \frac{D^2}{4}$
146	21316	3112136	12.0630	5.2636	2.16435	6.84954	4.4836	14.6	45.867	167415
147	21609	3176523	12.1244	5.2776	2.16732	6.80272	4.4904	.7	46.181	169717
148	21904	3241742	12.1665	5.2896	2.17026	6.75476	4.4972	.8	46.496	172034
149	22201	3307949	12.2066	5.3015	2.17319	6.71141	5.0039	.9	46.810	174366
150	22500	3375000	12.2474	5.3133	2.17609	6.66667	5.0106	15.0	47.124	176715
151	22801	3442951	12.2882	5.3251	2.17898	6.62252	5.0173	.1	47.438	179079
152	23104	3511808	12.3288	5.3368	2.18184	6.57895	5.0239	.2	47.752	181458
153	23409	3581577	12.3693	5.3485	2.18469	6.53595	5.0304	.3	48.066	183854
154	23716	3652264	12.4097	5.3601	2.18752	6.49351	5.0370	.4	48.381	186265
155	24025	3723875	12.4499	5.3717	2.19033	6.45161	5.0434	.5	48.695	188692
156	24336	3796416	12.4900	5.3832	2.19312	6.41026	5.0499	.6	49.009	191134
157	24649	3869893	12.5299	5.3947	2.19590	6.36943	5.0562	.7	49.323	193593
158	24964	3944312	12.5698	5.4061	2.19866	6.32911	5.0626	.8	49.637	196067
159	25281	4019679	12.6095	5.4175	2.20140	6.28931	5.0689	.9	49.951	198557
160	25600	4096000	12.6491	5.4288	2.20412	6.25000	5.0752	16.0	50.265	201062
161	25921	4173281	12.6886	5.4401	2.20683	6.21118	5.0814	.1	50.580	203583
162	26244	4251528	12.7279	5.4514	2.20952	6.17284	5.0876	.2	50.894	206120
163	26569	4330747	12.7671	5.4626	2.21219	6.13497	5.0938	.3	51.208	208672
164	26896	4410944	12.8062	5.4737	2.21484	6.09756	5.0999	.4	51.522	211241
165	27225	4492125	12.8452	5.4848	2.21748	6.06061	5.1059	.5	51.836	213825
166	27556	4574296	12.8841	5.4959	2.22011	6.02410	5.1120	.6	52.150	216424
167	27889	4657463	12.9228	5.5069	2.22272	5.98802	5.1180	.7	52.465	219040
168	28224	4741632	12.9615	5.5178	2.22531	5.95238	5.1240	.8	52.779	221671
169	28561	4826809	13.0000	5.5288	2.22789	5.91716	5.1299	.9	53.093	224318
170	28900	4913000	13.0384	5.5397	2.23045	5.88235	5.1358	17.0	53.407	226980
171	29241	5000211	13.0767	5.5505	2.23300	5.84795	5.1417	.1	53.721	229658
172	29584	5088448	13.1149	5.5613	2.23553	5.81395	5.1475	.2	54.035	232352
173	29929	5177717	13.1529	5.5721	2.23805	5.78035	5.1533	.3	54.350	235062
174	30276	5268024	13.1909	5.5828	2.24055	5.74713	5.1591	.4	54.664	237787
175	30625	5359375	13.2288	5.5934	2.24304	5.71429	5.1648	.5	54.978	240528
176	30976	5451776	13.2665	5.6041	2.24551	5.68182	5.1705	.6	55.292	243285
177	31329	5545233	13.3041	5.6147	2.24797	5.64972	5.1761	.7	55.606	246057
178	31684	5639752	13.3417	5.6252	2.25042	5.61798	5.1818	.8	55.920	248846
179	32041	5735339	13.3791	5.6357	2.25285	5.58669	5.1874	.9	56.235	251649
180	32400	5832000	13.4164	5.6462	2.25527	5.55556	5.1930	18.0	56.549	254469
181	32761	5929741	13.4536	5.6567	2.25768	5.52486	5.1985	.1	56.863	257304
182	33124	6028568	13.4900	5.6671	2.26007	5.49451	5.2040	.2	57.177	260155
183	33489	6128487	13.527	5.6774	2.26246	5.46448	5.2095	.3	57.491	263022
184	33856	6229504	13.564	5.6877	2.26482	5.43478	5.2149	.4	57.805	265904
185	34225	6331625	13.6015	5.6980	2.26717	5.40541	5.2204	.5	58.119	268803
186	34596	6434856	13.6382	5.7083	2.26951	5.37634	5.2257	.6	58.434	271716
187	34969	6539203	13.6748	5.7185	2.27184	5.34759	5.2311	.7	58.748	274646
188	35344	6644672	13.7113	5.7287	2.27416	5.31915	5.2364	.8	59.062	277591
189	35721	6751269	13.7477	5.7388	2.27646	5.29101	5.2417	.9	59.376	280552
190	36100	6859000	13.7840	5.7489	2.27875	5.26316	5.2470	19.0	59.690	283529
191	36481	6967871	13.8203	5.7590	2.28103	5.23560	5.2523	.1	60.004	286521
192	36864	7077888	13.8564	5.7690	2.28330	5.20833	5.2575	.2	60.319	289529
193	37249	7189057	13.8924	5.7790	2.28556	5.18135	5.2627	.3	60.633	292553
194	37636	7301384	13.9284	5.7890	2.28780	5.15464	5.2679	.4	60.947	295592
195	38025	7414875	13.9642	5.7989	2.29003	5.12821	5.2730	.5	61.261	298648
196	38416	7529536	14.0000	5.8088	2.29226	5.10204	5.2781	.6	61.575	301719
197	38809	7645373	14.0357	5.8186	2.29447	5.07614	5.2832	.7	61.889	304805
198	39204	7762392	14.0712	5.8285	2.29667	5.05061	5.2883	.8	62.204	307907
199	39601	7880599	14.1067	5.8383	2.29885	5.02513	5.2933	.9	62.518	311026



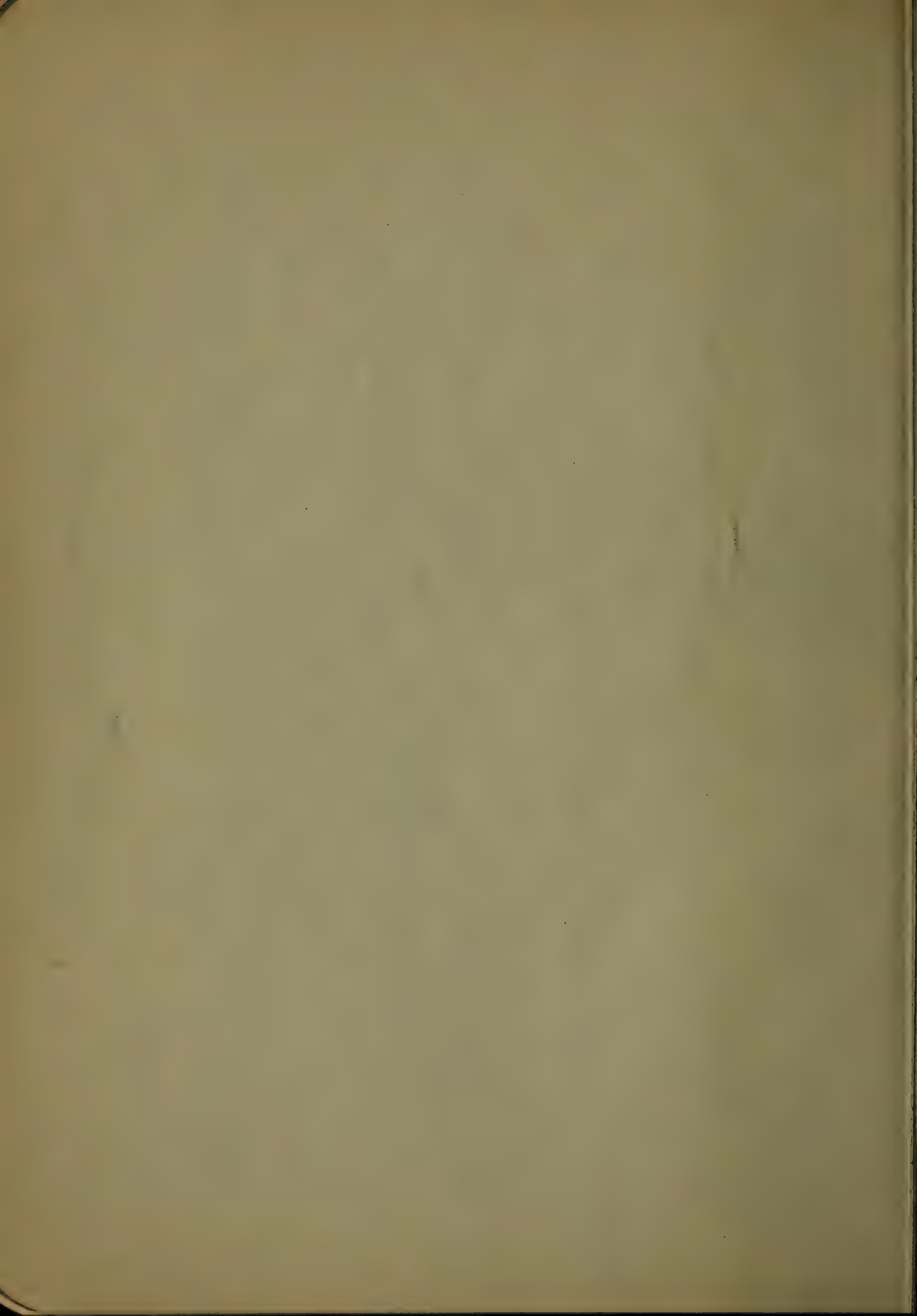




N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	log <sub>10</sub> $\frac{1}{N}$	Ln. N	D	$\sqrt{D}$	$\sqrt[3]{\frac{D^2}{4}}$
200	40000	8000000	14.1421	5.8480	5.30103	5.69896	5.29823	20	63.137	344.572
201	40401	8120601	14.1774	5.8530	5.30320	5.69679	5.29833	1	63.146	344.589
202	40804	8243208	14.1947	5.8579	5.30535	5.69464	5.29843	2	63.156	344.607
203	41209	8367837	14.2476	5.8774	5.30774	5.69241	5.29853	3	63.174	344.655
204	41616	8494564	14.2899	5.8862	5.30993	5.69019	5.29864	4	63.189	344.681
205	42025	8623375	14.3178	5.8944	5.31225	5.68796	5.29875	5	63.203	344.706
206	42436	8754264	14.3457	5.9025	5.31457	5.68573	5.29887	6	63.217	344.732
207	42849	8887237	14.3734	5.9105	5.31692	5.68349	5.29898	7	63.231	344.757
208	43264	9022300	14.4012	5.9184	5.31926	5.68126	5.29910	8	63.245	344.782
209	43681	9159459	14.4289	5.9263	5.32164	5.67903	5.29921	9	63.259	344.807
210	44100	9300000	14.4564	5.9341	5.32398	5.67679	5.29933	210	63.273	344.832
211	44521	9443031	14.4839	5.9419	5.32635	5.67456	5.29944	1	63.287	344.857
212	44944	9588552	14.5112	5.9497	5.32874	5.67233	5.29956	2	63.301	344.882
213	45369	9736569	14.5384	5.9574	5.33114	5.67010	5.29967	3	63.315	344.907
214	45796	9887092	14.5655	5.9651	5.33357	5.66787	5.29979	4	63.329	344.932
215	46225	10039231	14.5925	5.9728	5.33599	5.66564	5.29990	5	63.343	344.957
216	46656	10192984	14.6194	5.9805	5.33844	5.66341	5.29999	6	63.357	344.982
217	47089	10349261	14.6462	5.9882	5.34089	5.66118	5.30000	7	63.371	345.007
218	47524	10507072	14.6729	5.9959	5.34336	5.65895	5.30009	8	63.385	345.032
219	47961	10666429	14.6995	6.0036	5.34584	5.65672	5.30019	9	63.399	345.057
220	48400	10827300	14.7260	6.0113	5.34834	5.65449	5.30029	220	63.413	345.082
221	48841	10989691	14.7524	6.0190	5.35085	5.65226	5.30039	1	63.427	345.107
222	49284	11153704	14.7787	6.0267	5.35337	5.65003	5.30049	2	63.441	345.132
223	49729	11319249	14.8049	6.0344	5.35590	5.64780	5.30059	3	63.455	345.157
224	50176	11486324	14.8310	6.0421	5.35844	5.64557	5.30069	4	63.469	345.182
225	50625	11654931	14.8570	6.0498	5.36099	5.64334	5.30079	5	63.483	345.207
226	51076	11825072	14.8829	6.0575	5.36355	5.64111	5.30089	6	63.497	345.232
227	51529	11996749	14.9087	6.0652	5.36612	5.63888	5.30099	7	63.511	345.257
228	51984	12169964	14.9344	6.0729	5.36870	5.63665	5.30109	8	63.525	345.282
229	52441	12344719	14.9600	6.0806	5.37129	5.63442	5.30119	9	63.539	345.307
230	52900	12521000	14.9855	6.0883	5.37389	5.63219	5.30129	230	63.553	345.332
231	53361	12698811	15.0109	6.0960	5.37650	5.62996	5.30139	1	63.567	345.357
232	53824	12878152	15.0362	6.1037	5.37912	5.62773	5.30149	2	63.581	345.382
233	54289	13059029	15.0614	6.1114	5.38175	5.62550	5.30159	3	63.595	345.407
234	54756	13241444	15.0865	6.1191	5.38439	5.62327	5.30169	4	63.609	345.432
235	55225	13425491	15.1115	6.1268	5.38704	5.62104	5.30179	5	63.623	345.457
236	55696	13611172	15.1364	6.1345	5.38970	5.61881	5.30189	6	63.637	345.482
237	56169	13798491	15.1612	6.1422	5.39237	5.61658	5.30199	7	63.651	345.507
238	56644	13987344	15.1859	6.1499	5.39505	5.61435	5.30209	8	63.665	345.532
239	57121	14177739	15.2105	6.1576	5.39774	5.61212	5.30219	9	63.679	345.557
240	57600	14369680	15.2350	6.1653	5.40044	5.60989	5.30229	240	63.693	345.582
241	58081	14563171	15.2594	6.1730	5.40315	5.60766	5.30239	1	63.707	345.607
242	58564	14758204	15.2837	6.1807	5.40587	5.60543	5.30249	2	63.721	345.632
243	59049	14954789	15.3079	6.1884	5.40860	5.60320	5.30259	3	63.735	345.657
244	59536	15152924	15.3320	6.1961	5.41134	5.60097	5.30269	4	63.749	345.682
245	60025	15352611	15.3561	6.2038	5.41409	5.59874	5.30279	5	63.763	345.707
246	60516	15553852	15.3801	6.2115	5.41684	5.59651	5.30289	6	63.777	345.732
247	61009	15756649	15.4040	6.2192	5.41960	5.59428	5.30299	7	63.791	345.757
248	61504	15960992	15.4279	6.2269	5.42237	5.59205	5.30309	8	63.805	345.782
249	62001	16166881	15.4517	6.2346	5.42514	5.58982	5.30319	9	63.819	345.807
250	62500	16374320	15.4755	6.2423	5.42792	5.58759	5.30329	250	63.833	345.832



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	Ln. N	D	nD	$\frac{nD}{4}$
247	61009	1512237	5.4830	6.2489	2.39167	3.98106	5.5255	251	78.146	494.809
248	61504	1528218	5.4947	6.2614	2.39444	3.96225	5.5294	2	78.148	494.809
249	62001	1544427	5.5066	6.2747	2.39721	3.94347	5.5334	3	79.462	497.736
250	62500	1560864	5.5187	6.2888	2.40000	3.92471	5.5373	4	79.796	500.747
251	63001	1577535	5.5310	6.3036	2.40279	3.90605	5.5413	5	80.117	503.765
252	63504	1594440	5.5436	6.3182	2.40559	3.88750	5.5452	6	80.425	506.779
253	64009	1611585	5.5564	6.3336	2.40839	3.86905	5.5491	7	80.739	509.788
254	64516	1628964	5.5694	6.3489	2.41120	3.85070	5.5530	8	81.053	512.792
255	65025	1646583	5.5826	6.3641	2.41401	3.83245	5.5568	9	81.367	515.793
256	65536	1664448	5.5960	6.3792	2.41683	3.81430	5.5607	256	81.681	518.794
257	66049	1682565	5.6096	6.3942	2.41965	3.79625	5.5645	1	71.936	525.801
258	66564	1700932	5.6234	6.4091	2.42248	3.77830	5.5683	2	82.310	539.129
259	67081	1719555	5.6374	6.4239	2.42531	3.76045	5.5722	3	82.624	543.252
260	67600	1738432	5.6516	6.4387	2.42815	3.74270	5.5761	4	82.938	547.371
261	68121	1757565	5.6660	6.4534	2.43100	3.72505	5.5800	5	83.252	551.484
262	68644	1776960	5.6806	6.4681	2.43385	3.70750	5.5839	6	83.566	555.596
263	69169	1796615	5.6954	6.4827	2.43671	3.69005	5.5878	7	83.881	559.703
264	69696	1816536	5.7104	6.4973	2.43957	3.67270	5.5917	8	84.195	563.804
265	70225	1836725	5.7256	6.5118	2.44244	3.65545	5.5956	9	84.509	567.902
266	70756	1857188	5.7410	6.5263	2.44531	3.63830	5.5995	266	84.823	572.005
267	71289	1877925	5.7566	6.5407	2.44819	3.62125	5.6034	1	85.137	576.104
268	71824	1898932	5.7724	6.5551	2.45107	3.60430	5.6073	2	85.451	580.204
269	72361	1920215	5.7884	6.5694	2.45396	3.58745	5.6112	3	85.766	584.304
270	72900	1941780	5.8046	6.5837	2.45685	3.57070	5.6151	4	86.081	588.404
271	73441	1963625	5.8210	6.5980	2.45975	3.55405	5.6190	5	86.396	592.504
272	73984	1985752	5.8376	6.6122	2.46265	3.53750	5.6229	6	86.711	596.604
273	74529	2008165	5.8544	6.6263	2.46556	3.52105	5.6268	7	87.026	600.704
274	75076	2030868	5.8714	6.6404	2.46847	3.50470	5.6307	8	87.341	604.804
275	75625	2053865	5.8886	6.6545	2.47139	3.48845	5.6346	9	87.656	608.904
276	76176	2077160	5.9060	6.6685	2.47431	3.47230	5.6385	276	87.971	613.004
277	76729	2100765	5.9236	6.6825	2.47724	3.45625	5.6424	1	88.286	617.104
278	77284	2124680	5.9414	6.6964	2.48017	3.44030	5.6463	2	88.601	621.204
279	77841	2148905	5.9594	6.7103	2.48311	3.42445	5.6502	3	88.916	625.304
280	78400	2173440	5.9776	6.7241	2.48605	3.40870	5.6541	280	89.231	629.404
281	78961	2198285	5.9960	6.7379	2.48900	3.39305	5.6580	1	89.546	633.504
282	79524	2223440	6.0146	6.7516	2.49195	3.37750	5.6619	2	89.861	637.604
283	80089	2248905	6.0334	6.7653	2.49491	3.36205	5.6658	3	90.176	641.704
284	80656	2274680	6.0524	6.7789	2.49787	3.34670	5.6697	4	90.491	645.804
285	81225	2300765	6.0716	6.7925	2.50084	3.33145	5.6736	5	90.806	649.904
286	81796	2327160	6.0910	6.8061	2.50381	3.31630	5.6775	6	91.121	654.004
287	82369	2353865	6.1106	6.8196	2.50679	3.30125	5.6814	7	91.436	658.104
288	82944	2380880	6.1304	6.8331	2.50977	3.28630	5.6853	8	91.751	662.204
289	83521	2408205	6.1504	6.8465	2.51276	3.27145	5.6892	9	92.066	666.304
290	84100	2435840	6.1706	6.8599	2.51575	3.25670	5.6931	290	92.381	670.404
291	84681	2463785	6.1910	6.8732	2.51875	3.24205	5.6970	1	92.696	674.504
292	85264	2492040	6.2116	6.8865	2.52175	3.22750	5.7009	2	93.011	678.604
293	85849	2520605	6.2324	6.8997	2.52476	3.21305	5.7048	3	93.326	682.704
294	86436	2549480	6.2534	6.9129	2.52777	3.19870	5.7087	4	93.641	686.804
295	87025	2578665	6.2746	6.9261	2.53079	3.18445	5.7126	5	93.956	690.904
296	87616	2608160	6.2960	6.9392	2.53381	3.17030	5.7165	6	94.271	695.004
297	88209	2637975	6.3176	6.9523	2.53684	3.15625	5.7204	7	94.586	699.104
298	88804	2668110	6.3394	6.9653	2.53987	3.14230	5.7243	8	94.901	703.204
299	89401	2698565	6.3614	6.9783	2.54291	3.12845	5.7282	9	95.216	707.304
300	90000	2729340	6.3836	7.0000	2.54600	3.11470	5.7321	300	95.531	711.404





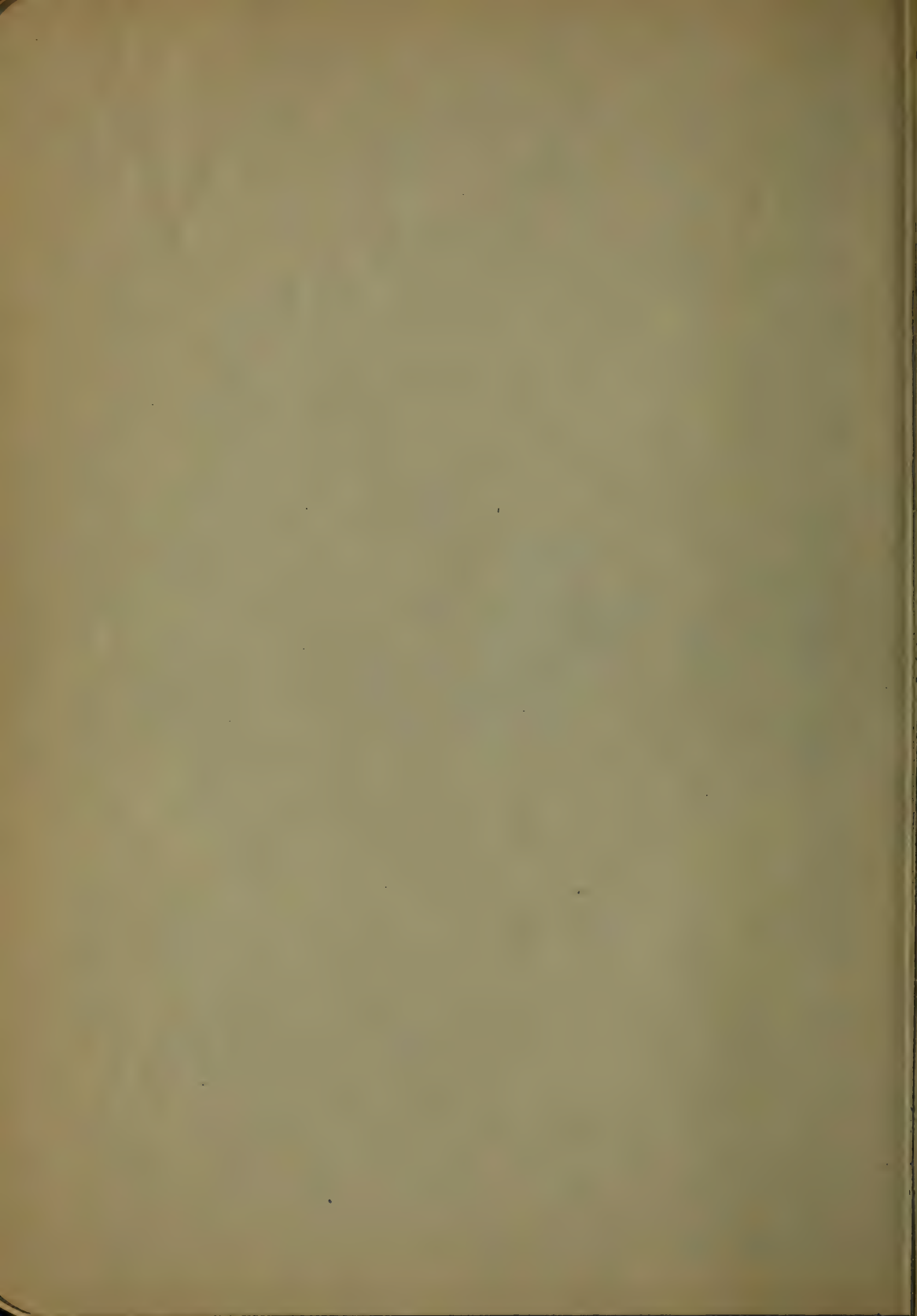


N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	Ln. N	D	$\pi D$	$\frac{D^2}{4}$
301	90601	27270901	17.3494	6.7018	2.47857	3.32226	5.7071	30.1	94.562	216.879
302	91204	27543608	17.3781	6.7092	2.48001	3.31126	5.7104	30.2	94.874	218.315
303	91809	27818127	17.4069	6.7166	2.48144	3.30033	5.7137	30.3	95.190	219.766
304	92416	28094464	17.4356	6.7240	2.48287	3.28947	5.7170	30.4	95.504	221.234
305	93025	28372625	17.4642	6.7313	2.48430	3.27869	5.7203	30.5	95.819	222.717
306	93636	28652616	17.4929	6.7387	2.48572	3.26797	5.7236	30.6	96.133	224.215
307	94249	28934443	17.5214	6.7460	2.48714	3.25733	5.7268	30.7	96.447	225.720
308	94864	29218112	17.5499	6.7533	2.48855	3.24675	5.7301	30.8	96.761	227.240
309	95481	29503629	17.5784	6.7606	2.48996	3.23625	5.7333	30.9	97.075	228.776
310	96100	29791000	17.6068	6.7679	2.49136	3.22581	5.7366	31.0	97.389	230.328
311	96721	30080231	17.6352	6.7752	2.49275	3.21543	5.7398	31.1	97.704	231.895
312	97344	30371328	17.6635	6.7824	2.49415	3.20513	5.7430	31.2	98.018	233.478
313	97969	30664297	17.6918	6.7897	2.49554	3.19489	5.7462	31.3	98.332	235.077
314	98596	30959144	17.7200	6.7969	2.49693	3.18471	5.7494	31.4	98.646	236.691
315	99225	31255875	17.7482	6.8041	2.49831	3.17460	5.7526	31.5	98.960	238.321
316	99856	31554496	17.7764	6.8113	2.49969	3.16456	5.7557	31.6	99.274	239.967
317	100489	31855013	17.8045	6.8185	2.50106	3.15457	5.7589	31.7	99.588	241.629
318	101124	32157432	17.8326	6.8256	2.50243	3.14465	5.7621	31.8	99.903	243.306
319	101761	32461759	17.8606	6.8328	2.50379	3.13480	5.7652	31.9	100.218	244.999
320	102400	32768000	17.8885	6.8399	2.50515	3.12500	5.7683	32.0	100.533	246.708
321	103041	33076161	17.9165	6.8470	2.50651	3.11527	5.7714	32.1	100.848	248.432
322	103684	33386248	17.9444	6.8541	2.50786	3.10569	5.7746	32.2	101.163	250.171
323	104329	33698267	17.9722	6.8612	2.50920	3.09618	5.7777	32.3	101.478	251.926
324	104976	34012224	18.0000	6.8683	2.51055	3.08672	5.7807	32.4	101.793	253.697
325	105625	34328125	18.0278	6.8753	2.51188	3.07732	5.7838	32.5	102.108	255.484
326	106276	34645976	18.0555	6.8824	2.51322	3.06797	5.7869	32.6	102.423	257.287
327	106929	34965783	18.0831	6.8894	2.51455	3.05868	5.7900	32.7	102.738	259.106
328	107584	35287552	18.1108	6.8964	2.51587	3.04944	5.7930	32.8	103.053	260.941
329	108241	35611289	18.1384	6.9034	2.51720	3.04025	5.7961	32.9	103.368	262.791
330	108900	35937000	18.1659	6.9104	2.51851	3.03110	5.7991	33.0	103.683	264.656
331	109561	36264691	18.1934	6.9174	2.51983	3.02200	5.8021	33.1	103.998	266.537
332	110224	36594368	18.2209	6.9244	2.52114	3.01295	5.8051	33.2	104.313	268.434
333	110889	36926037	18.2483	6.9313	2.52244	3.00395	5.8081	33.3	104.628	270.347
334	111556	37259704	18.2757	6.9382	2.52375	2.99499	5.8111	33.4	104.943	272.276
335	112225	37595375	18.3030	6.9451	2.52504	2.98607	5.8141	33.5	105.258	274.221
336	112896	37933056	18.3303	6.9521	2.52634	2.97719	5.8171	33.6	105.573	276.182
337	113569	38272753	18.3575	6.9589	2.52763	2.96836	5.8201	33.7	105.888	278.159
338	114244	38614472	18.3848	6.9658	2.52892	2.95958	5.8230	33.8	106.203	280.152
339	114921	38958219	18.4120	6.9727	2.53020	2.95085	5.8260	33.9	106.518	282.161
340	115600	39304000	18.4391	6.9795	2.53148	2.94218	5.8289	34.0	106.833	284.186
341	116281	39651821	18.4662	6.9864	2.53275	2.93355	5.8319	34.1	107.148	286.227
342	116964	40001688	18.4932	6.9932	2.53403	2.92497	5.8348	34.2	107.463	288.284
343	117649	40353607	18.5203	6.9999	2.53530	2.91644	5.8377	34.3	107.778	290.357
344	118336	40707584	18.5472	7.0068	2.53656	2.90796	5.8406	34.4	108.093	292.446
345	119025	41063625	18.5742	7.0136	2.53782	2.89952	5.8435	34.5	108.408	294.551
346	119716	41421736	18.6011	7.0203	2.53908	2.89112	5.8464	34.6	108.723	296.672
347	120409	41781923	18.6279	7.0271	2.54033	2.88276	5.8493	34.7	109.038	298.809
348	121104	42144192	18.6548	7.0338	2.54158	2.87444	5.8522	34.8	109.353	300.962
349	121801	42508549	18.6816	7.0406	2.54283	2.86615	5.8551	34.9	109.668	303.131
350	122500	42875000	18.7083	7.0473	2.54407	2.85790	5.8579	35.0	109.983	305.316



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	LOG N	1000 $\frac{1}{N}$	LN. N.	D	$\Delta D$	$\frac{D^2}{N}$
351	123201	43243551	18.7360	7.0540	2.54531	2.84900	5.8608	35.1	116.37	967.018
352	123904	43614808	18.7617	7.0607	2.54654	2.84091	5.8636	35.2	116.48	973.14
353	124609	43986977	18.7873	7.0674	2.54777	2.83286	5.8665	35.3	116.59	978.677
354	125316	44360054	18.8149	7.0740	2.54900	2.82486	5.8693	35.4	116.71	984.230
355	126025	44734055	18.8414	7.0807	2.55023	2.81690	5.8721	35.5	116.83	989.798
356	126736	45108016	18.8680	7.0873	2.55146	2.80899	5.8749	35.6	116.94	995.382
357	127449	45482953	18.8944	7.0940	2.55267	2.80112	5.8777	35.7	117.06	1000.98
358	128164	45858872	18.9209	7.1006	2.55388	2.79330	5.8805	35.8	117.17	1006.60
359	128881	46234789	18.9473	7.1072	2.55509	2.78552	5.8833	35.9	117.28	1012.23
360	129600	46610700	18.9737	7.1138	2.55630	2.77778	5.8861	36.0	117.40	1017.88
361	130321	46986621	19.0000	7.1204	2.55751	2.77008	5.8889	36.1	117.51	1023.54
362	131044	47362548	19.0263	7.1269	2.55871	2.76243	5.8916	36.2	117.63	1029.22
363	131769	47738487	19.0526	7.1335	2.55991	2.75482	5.8944	36.3	117.74	1034.91
364	132496	48114434	19.0788	7.1400	2.56110	2.74725	5.8972	36.4	117.85	1040.62
365	133225	48490385	19.1050	7.1466	2.56229	2.73973	5.8999	36.5	117.97	1046.35
366	133956	48866346	19.1311	7.1531	2.56348	2.73224	5.9026	36.6	118.08	1052.09
367	134689	49242313	19.1572	7.1596	2.56467	2.72480	5.9054	36.7	118.20	1057.85
368	135424	49618282	19.1833	7.1661	2.56585	2.71739	5.9081	36.8	118.31	1063.62
369	136161	50000000	19.2094	7.1726	2.56703	2.71003	5.9109	36.9	118.42	1069.41
370	136900	50380600	19.2354	7.1791	2.56820	2.70270	5.9135	37.0	118.54	1075.21
371	137641	50761201	19.2614	7.1856	2.56937	2.69542	5.9162	37.1	118.65	1081.03
372	138384	51141808	19.2873	7.1920	2.57054	2.68817	5.9189	37.2	118.77	1086.87
373	139129	51522421	19.3132	7.1984	2.57171	2.68097	5.9216	37.3	118.88	1092.72
374	139876	51903044	19.3391	7.2048	2.57287	2.67380	5.9243	37.4	118.99	1098.58
375	140625	52283675	19.3649	7.2112	2.57403	2.66667	5.9269	37.5	119.11	1104.47
376	141376	52664316	19.3907	7.2177	2.57519	2.65957	5.9296	37.6	119.22	1110.36
377	142129	53044963	19.4165	7.2240	2.57634	2.65252	5.9322	37.7	119.34	1116.28
378	142884	53425620	19.4422	7.2304	2.57749	2.64550	5.9349	37.8	119.45	1122.21
379	143641	53806289	19.4679	7.2368	2.57864	2.63852	5.9375	37.9	119.57	1128.15
380	144400	54186960	19.4936	7.2432	2.57978	2.63158	5.9402	38.0	119.68	1134.11
381	145161	54567641	19.5192	7.2495	2.58093	2.62467	5.9428	38.1	119.80	1140.09
382	145924	54948328	19.5448	7.2558	2.58206	2.61760	5.9454	38.2	120.01	1146.08
383	146689	55329021	19.5704	7.2622	2.58320	2.61067	5.9480	38.3	120.12	1152.09
384	147456	55709724	19.5959	7.2685	2.58433	2.60377	5.9506	38.4	120.24	1158.12
385	148225	56090435	19.6214	7.2748	2.58546	2.59690	5.9532	38.5	120.35	1164.16
386	148996	56471156	19.6469	7.2811	2.58659	2.59007	5.9558	38.6	120.47	1170.21
387	149769	56851889	19.6723	7.2874	2.58771	2.58318	5.9584	38.7	120.58	1176.28
388	150544	57232632	19.6977	7.2936	2.58883	2.57632	5.9610	38.8	120.70	1182.37
389	151321	57613389	19.7231	7.2999	2.58995	2.56949	5.9636	38.9	120.81	1188.47
390	152100	57994160	19.7484	7.3061	2.59106	2.56260	5.9661	39.0	120.92	1194.59
391	152881	58374941	19.7737	7.3124	2.59218	2.55575	5.9687	39.1	121.04	1200.72
392	153664	58755728	19.7990	7.3186	2.59329	2.54892	5.9713	39.2	121.15	1206.87
393	154449	59136521	19.8242	7.3248	2.59440	2.54203	5.9738	39.3	121.27	1213.04
394	155236	59517324	19.8494	7.3310	2.59550	2.53517	5.9764	39.4	121.38	1219.22
395	156025	59898135	19.8746	7.3372	2.59660	2.52836	5.9789	39.5	121.50	1225.42
396	156816	60278956	19.8997	7.3434	2.59770	2.52152	5.9814	39.6	121.61	1231.63
397	157609	60659789	19.9249	7.3496	2.59879	2.51473	5.9839	39.7	121.72	1237.86
398	158404	61040632	19.9500	7.3558	2.59988	2.50790	5.9865	39.8	121.84	1244.10
399	159201	61421489	19.9750	7.3619	2.60097	2.50112	5.9890	39.9	121.95	1250.36
400	160000	61802360	20.0000	7.3681	2.60206	2.50000	5.9915	40.0	122.06	1256.64



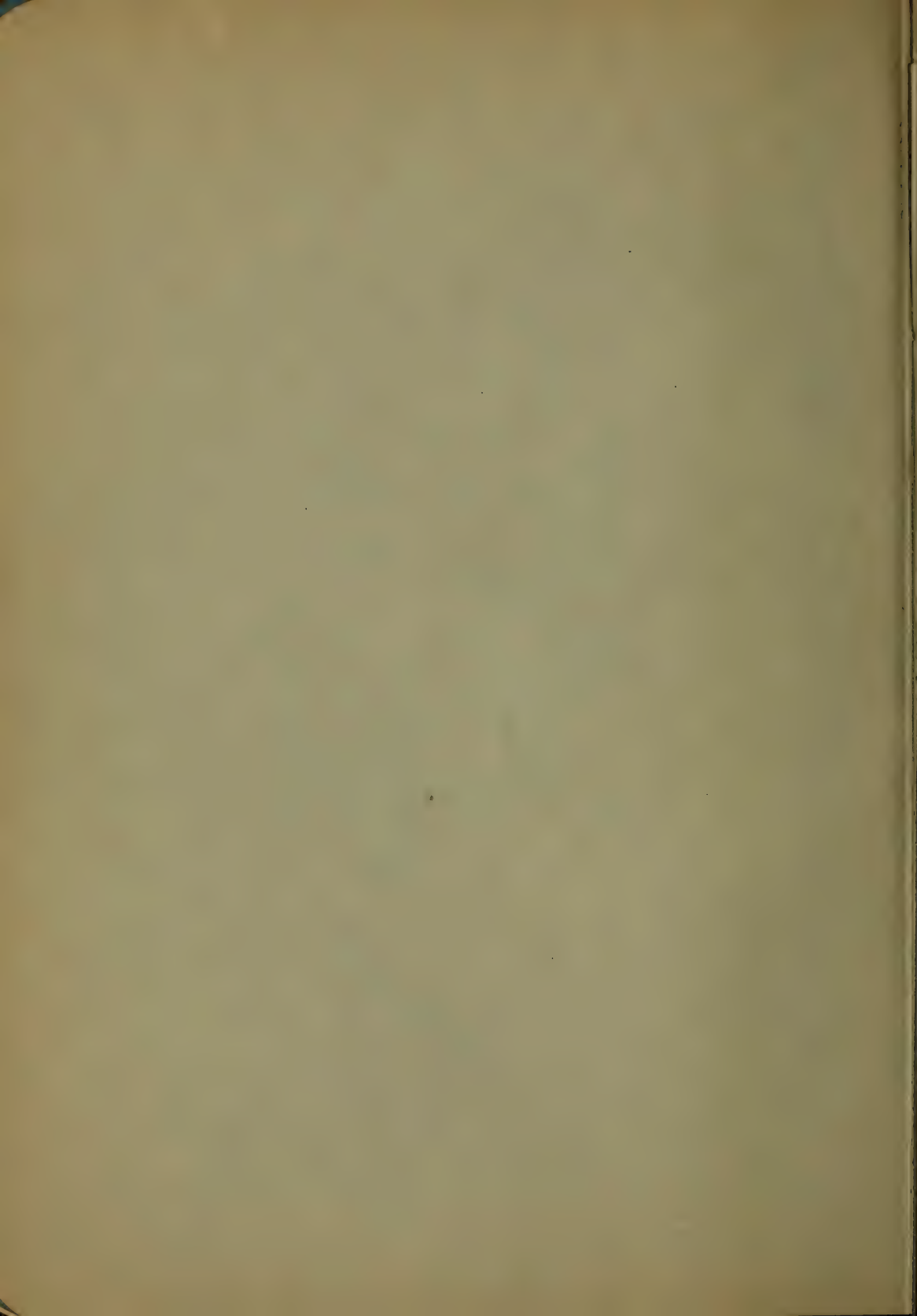




N	N <sup>2</sup>	N <sup>3</sup>	VN	$\sqrt[3]{N}$	log N	1000 $\frac{1}{N}$	Ln N	D	nD	$\frac{n^2}{4}$
401	160801	64481001	20.0250	7.3742	2.60314	2.49177	5.9440	40.1	125.98	1259.93
402	161604	65040808	20.0449	7.3803	2.60423	2.48776	5.9465	2	126.29	1269.23
403	162409	65608227	20.0749	7.3864	2.60531	2.48379	5.9489	3	126.61	1275.66
404	163216	66183264	20.1049	7.3925	2.60639	2.47985	6.0014	4	126.95	1281.90
405	164025	667649125	20.1246	7.3986	2.60746	2.46914	6.0039	5	127.29	1288.25
406	164836	66923416	20.1494	7.4047	2.60853	2.46305	6.0064	6	127.55	1294.62
407	165649	67491143	20.1742	7.4108	2.60959	2.45704	6.0088	7	127.84	1301.01
408	166464	67977112	20.1990	7.4169	2.61064	2.45098	6.0113	8	128.18	1307.41
409	167281	68471929	20.2237	7.4230	2.61172	2.44499	6.0137	9	128.49	1313.83
410	168100	68975100	20.2485	7.4291	2.61278	2.43902	6.0162	41.0	128.81	1320.25
411	168921	69486731	20.2731	7.4350	2.61384	2.43309	6.0186	1	129.12	1326.70
412	169744	69996832	20.2978	7.4410	2.61490	2.42718	6.0210	2	129.43	1333.17
413	170569	70496497	20.3224	7.4470	2.61595	2.42131	6.0234	3	129.75	1339.65
414	171396	70995724	20.3470	7.4530	2.61700	2.41536	6.0258	4	130.06	1346.14
415	172225	714945125	20.3715	7.4590	2.61805	2.40944	6.0283	5	130.38	1352.65
416	173056	71992864	20.3961	7.4650	2.61909	2.40355	6.0307	6	130.69	1359.18
417	173889	72490783	20.4206	7.4710	2.62014	2.39768	6.0331	7	131.00	1365.72
418	174724	72988262	20.4454	7.4770	2.62118	2.39183	6.0355	8	131.32	1372.27
419	175561	73485309	20.4699	7.4829	2.62221	2.38594	6.0379	9	131.63	1378.83
420	176400	73981900	20.4949	7.4889	2.62325	2.38005	6.0403	42.0	131.95	1385.44
421	177241	74478041	20.5193	7.4948	2.62428	2.37538	6.0426	1	132.26	1392.05
422	178084	74973732	20.5436	7.5007	2.62531	2.36947	6.0450	2	132.58	1398.67
423	178929	75468987	20.5679	7.5067	2.62634	2.36357	6.0474	3	132.89	1405.31
424	179776	75963794	20.5919	7.5126	2.62737	2.35768	6.0497	4	133.20	1411.96
425	180625	764581625	20.6165	7.5185	2.62839	2.35183	6.0521	5	133.52	1418.63
426	181476	76952196	20.6409	7.5244	2.62941	2.34594	6.0544	6	133.83	1425.31
427	182329	77445893	20.6649	7.5302	2.63043	2.34005	6.0568	7	134.15	1432.01
428	183184	77939252	20.6892	7.5361	2.63144	2.33415	6.0591	8	134.46	1438.72
429	184041	78432289	20.7133	7.5420	2.63246	2.32826	6.0615	9	134.77	1445.45
430	184896	78925900	20.7374	7.5478	2.63347	2.32233	6.0638	43.0	135.09	1452.20
431	185753	79419081	20.7613	7.5537	2.63448	2.31639	6.0661	1	135.40	1458.96
432	186612	79911832	20.7854	7.5595	2.63548	2.31042	6.0684	2	135.72	1465.74
433	187473	80405167	20.8093	7.5654	2.63649	2.30447	6.0707	3	136.03	1472.54
434	188336	80898084	20.8331	7.5712	2.63749	2.29851	6.0730	4	136.35	1479.34
435	189201	81391585	20.8570	7.5770	2.63849	2.29255	6.0753	5	136.67	1486.17
436	190068	81884676	20.8808	7.5828	2.63949	2.28658	6.0776	6	136.98	1493.01
437	190937	82377353	20.9045	7.5886	2.64048	2.28063	6.0799	7	137.30	1499.87
438	191808	82870612	20.9283	7.5944	2.64148	2.27467	6.0822	8	137.62	1506.74
439	192681	83363459	20.9523	7.6001	2.64244	2.26870	6.0845	9	137.93	1513.63
440	193560	83856800	20.9762	7.6059	2.64345	2.26272	6.0868	44.0	138.25	1520.53
441	194441	84350731	21.0000	7.6117	2.64446	2.25675	6.0890	1	138.57	1527.45
442	195324	84845248	21.0238	7.6175	2.64546	2.25078	6.0913	2	138.89	1534.39
443	196209	85339357	21.0476	7.6232	2.64646	2.24481	6.0936	3	139.21	1541.34
444	197096	85833054	21.0713	7.6289	2.64746	2.23883	6.0958	4	139.53	1548.30
445	197985	86327345	21.0950	7.6346	2.64846	2.23285	6.0981	5	139.85	1555.28
446	198876	86822224	21.1187	7.6403	2.64946	2.22687	6.1003	6	140.17	1562.28
447	199769	87317703	21.1424	7.6460	2.65046	2.22089	6.1026	7	140.49	1569.30
448	200664	87813788	21.1660	7.6517	2.65146	2.21490	6.1048	8	140.81	1576.33
449	201561	88310483	21.1896	7.6574	2.65246	2.20892	6.1070	9	141.13	1583.37
450	202460	88807700	21.2132	7.6631	2.65346	2.20292	6.1092	45.0	141.45	1590.43



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	Ln. N	D	$\pi D$	$\frac{D^2}{4}$
451	203401	91753851	21.268	7.6858	2.65418	2.21730	6.1115	45.1	141.49	1597.51
452	204304	92345008	21.269	7.6864	2.65814	2.21239	6.1137	.2	142.00	1604.00
453	205209	92936177	21.274	7.6881	2.66210	2.20731	6.1159	.3	142.51	1610.51
454	206116	93527344	21.303	7.6857	2.66706	2.20264	6.1181	.4	143.03	1618.03
455	207025	94118513	21.330	7.6914	2.65801	2.19780	6.1203	.5	143.54	1625.57
456	207936	94710686	21.354	7.6970	2.65896	2.19298	6.1225	.6	144.06	1633.13
457	208849	95302863	21.377	7.7026	2.65992	2.18818	6.1247	.7	144.57	1640.70
458	209764	95895042	21.400	7.7082	2.66087	2.18341	6.1269	.8	145.09	1648.28
459	210681	96487225	21.423	7.7138	2.66183	2.17865	6.1291	.9	145.60	1655.86
460	211600	97079400	21.446	7.7194	2.66276	2.17391	6.1312	46.0	146.12	1663.40
461	212521	97671581	21.470	7.7250	2.66370	2.16920	6.1334	.1	146.63	1670.94
462	213444	98263764	21.493	7.7306	2.66464	2.16450	6.1356	.2	147.15	1678.50
463	214369	98855949	21.517	7.7362	2.66558	2.15983	6.1377	.3	147.66	1686.06
464	215296	99448134	21.540	7.7418	2.66652	2.15517	6.1399	.4	148.18	1693.63
465	216225	100040321	21.563	7.7473	2.66745	2.15054	6.1420	.5	148.69	1701.21
466	217156	100632516	21.587	7.7529	2.66839	2.14592	6.1442	.6	149.21	1708.80
467	218089	101224713	21.610	7.7584	2.66932	2.14133	6.1463	.7	149.72	1716.40
468	219024	101816912	21.633	7.7639	2.67025	2.13675	6.1485	.8	150.24	1724.00
469	219961	102409113	21.656	7.7695	2.67117	2.13220	6.1506	.9	150.75	1731.61
470	220900	103001316	21.679	7.7750	2.67210	2.12766	6.1527	47.0	151.27	1739.24
471	221841	103593521	21.702	7.7805	2.67302	2.12314	6.1549	.1	151.78	1746.88
472	222784	104185728	21.725	7.7860	2.67394	2.11864	6.1570	.2	152.30	1754.53
473	223729	104777937	21.748	7.7915	2.67486	2.11417	6.1591	.3	152.81	1762.19
474	224676	105370148	21.771	7.7970	2.67578	2.10971	6.1612	.4	153.33	1769.86
475	225625	105962361	21.794	7.8025	2.67669	2.10526	6.1633	.5	153.84	1777.54
476	226576	106554576	21.817	7.8079	2.67761	2.10083	6.1654	.6	154.36	1785.23
477	227529	107146793	21.840	7.8134	2.67852	2.09644	6.1675	.7	154.87	1792.93
478	228484	107739012	21.863	7.8188	2.67943	2.09205	6.1696	.8	155.39	1800.64
479	229441	108331233	21.886	7.8243	2.68034	2.08768	6.1717	.9	155.90	1808.36
480	230400	108923456	21.909	7.8297	2.68124	2.08333	6.1738	48.0	156.42	1816.00
481	231361	109515681	21.932	7.8352	2.68215	2.07900	6.1759	.1	156.93	1823.65
482	232324	110107908	21.955	7.8406	2.68305	2.07469	6.1779	.2	157.45	1831.31
483	233289	110700137	21.978	7.8460	2.68395	2.07039	6.1800	.3	157.96	1838.98
484	234256	111292368	22.001	7.8514	2.68485	2.06612	6.1821	.4	158.48	1846.66
485	235225	111884601	22.024	7.8568	2.68574	2.06186	6.1841	.5	158.99	1854.35
486	236196	112476836	22.047	7.8622	2.68664	2.05761	6.1862	.6	159.51	1862.05
487	237169	113069073	22.070	7.8676	2.68753	2.05338	6.1883	.7	160.02	1869.76
488	238144	113661312	22.093	7.8730	2.68842	2.04918	6.1903	.8	160.54	1877.48
489	239121	114253553	22.116	7.8784	2.68931	2.04499	6.1924	.9	161.05	1885.21
490	240100	114845800	22.139	7.8837	2.69020	2.04082	6.1944	49.0	161.57	1892.96
491	241081	115438049	22.162	7.8891	2.69109	2.03666	6.1964	.1	162.08	1900.72
492	242064	116030300	22.185	7.8944	2.69197	2.03252	6.1985	.2	162.60	1908.49
493	243049	116622553	22.208	7.8998	2.69285	2.02839	6.2005	.3	163.11	1916.27
494	244036	117214808	22.231	7.9051	2.69373	2.02429	6.2025	.4	163.63	1924.06
495	245025	117807065	22.254	7.9105	2.69461	2.02020	6.2046	.5	164.14	1931.87
496	246016	118400324	22.277	7.9158	2.69548	2.01613	6.2066	.6	164.66	1939.69
497	247009	118993585	22.300	7.9211	2.69636	2.01207	6.2086	.7	165.17	1947.52
498	248004	119586848	22.323	7.9264	2.69723	2.00803	6.2106	.8	165.69	1955.36
499	249001	120180113	22.346	7.9317	2.69810	2.00401	6.2126	.9	166.20	1963.21
500	250000	120773380	22.369	7.9370	2.69897	2.00000	6.2146	50.0	166.72	1971.00



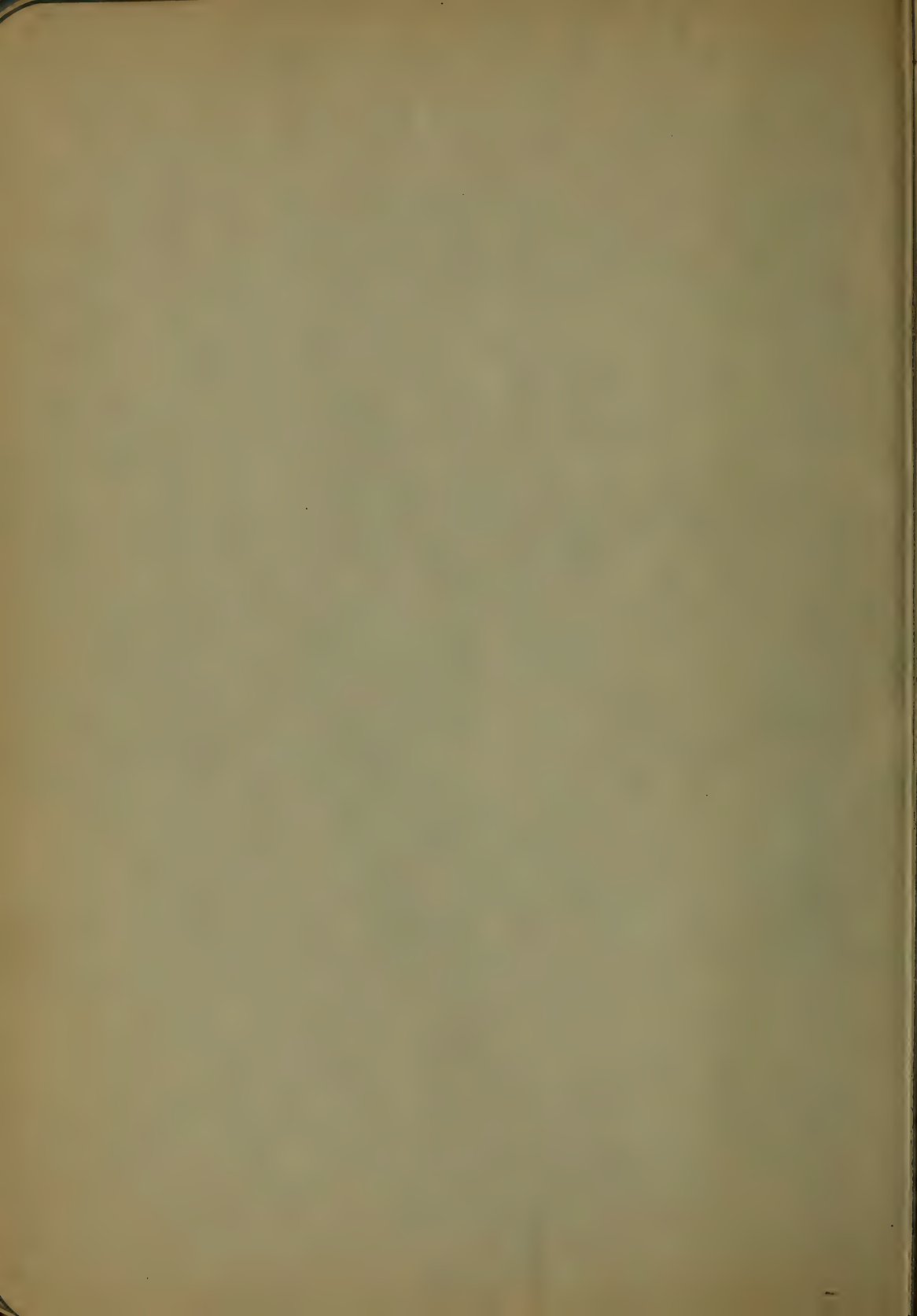




N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	Ln. N	D	$\pi D$	$\pi \frac{D^2}{4}$
501	251001	125751501	22.3830	7.9423	2.49484	1.99601	6.2166	501	15739	1971.36
502	252004	126506008	22.4054	7.9476	2.70070	1.99203	6.2186	2	15771	1979.23
503	253009	127263527	22.4277	7.9528	2.70157	1.98807	6.2206	3	15802	1987.13
504	254016	128024064	22.4499	7.9581	2.70243	1.98413	6.2226	4	15834	1995.04
505	255025	128787625	22.4722	7.9634	2.70329	1.98020	6.2246	5	15865	2002.96
506	256036	129554216	22.4944	7.9686	2.70415	1.97629	6.2265	6	15897	2010.90
507	257049	130323843	22.5167	7.9739	2.70501	1.97239	6.2285	7	15928	2018.84
508	258064	131096512	22.5389	7.9791	2.70586	1.96850	6.2305	8	15959	2026.83
509	259081	131872229	22.5610	7.9843	2.70672	1.96464	6.2324	9	15991	2034.82
510	260100	132651000	22.5832	7.9896	2.70757	1.96078	6.2344	510	16022	2042.82
511	261121	133432831	22.6053	7.9948	2.70842	1.95695	6.2364	1	16054	2050.84
512	262144	134217728	22.6274	8.0000	2.70927	1.95312	6.2383	2	16085	2058.87
513	263169	135005697	22.6495	8.0052	2.71012	1.94932	6.2403	3	16116	2066.92
514	264196	135796744	22.6716	8.0104	2.71096	1.94553	6.2422	4	16148	2074.99
515	265225	136590875	22.6936	8.0156	2.71181	1.94175	6.2442	5	16179	2083.07
516	266256	137388096	22.7156	8.0208	2.71265	1.93798	6.2461	6	16211	2091.17
517	267289	138188413	22.7376	8.0260	2.71349	1.93424	6.2480	7	16242	2099.28
518	268324	138991832	22.7596	8.0311	2.71433	1.93050	6.2500	8	16273	2107.41
519	269361	139798359	22.7816	8.0363	2.71517	1.92678	6.2519	9	16305	2115.56
520	270400	140608000	22.8035	8.0415	2.71600	1.92308	6.2538	520	16336	2123.72
521	271441	141420761	22.8254	8.0466	2.71684	1.91939	6.2558	1	16368	2131.89
522	272484	142236648	22.8473	8.0517	2.71767	1.91571	6.2577	2	16399	2140.08
523	273529	143055667	22.8692	8.0569	2.71850	1.91205	6.2596	3	16431	2148.29
524	274576	143877824	22.8910	8.0620	2.71933	1.90840	6.2615	4	16462	2156.51
525	275625	144703125	22.9129	8.0671	2.72016	1.90476	6.2634	5	16493	2164.75
526	276676	145531576	22.9347	8.0723	2.72099	1.90114	6.2653	6	16525	2173.01
527	277729	146363183	22.9565	8.0774	2.72181	1.89753	6.2672	7	16556	2181.28
528	278784	147197952	22.9783	8.0825	2.72263	1.89394	6.2691	8	16588	2189.56
529	279841	148035889	23.0000	8.0876	2.72346	1.89036	6.2710	9	16619	2197.87
530	280900	148877000	23.0217	8.0927	2.72428	1.88679	6.2729	530	16650	2206.18
531	281961	149721291	23.0434	8.0978	2.72509	1.88324	6.2748	1	16682	2214.52
532	283024	150568768	23.0651	8.1028	2.72591	1.87970	6.2766	2	16713	2222.87
533	284089	151419437	23.0868	8.1079	2.72673	1.87617	6.2785	3	16745	2231.23
534	285156	152273304	23.1084	8.1130	2.72754	1.87266	6.2804	4	16776	2239.61
535	286225	153130375	23.1301	8.1180	2.72835	1.86916	6.2823	5	16808	2248.01
536	287296	153990656	23.1517	8.1231	2.72916	1.86567	6.2841	6	16839	2256.42
537	288369	154854153	23.1733	8.1281	2.72997	1.86220	6.2860	7	16870	2264.84
538	289444	155720872	23.1948	8.1332	2.73078	1.85874	6.2879	8	16902	2273.29
539	290521	156590819	23.2164	8.1382	2.73159	1.85529	6.2897	9	16933	2281.75
540	291600	157464000	23.2379	8.1433	2.73239	1.85185	6.2916	540	16965	2290.22
541	292681	158340421	23.2594	8.1483	2.73320	1.84843	6.2934	1	16996	2298.71
542	293764	159220084	23.2809	8.1533	2.73400	1.84502	6.2954	2	17027	2307.22
543	294849	160103007	23.3024	8.1583	2.73480	1.84162	6.2971	3	17059	2315.74
544	295936	160989184	23.3238	8.1633	2.73560	1.83824	6.2989	4	17090	2324.28
545	297025	161878625	23.3452	8.1683	2.73640	1.83486	6.3008	5	17122	2332.83
546	298116	162771336	23.3666	8.1733	2.73719	1.83150	6.3026	6	17153	2341.40
547	299209	163667323	23.3880	8.1783	2.73799	1.82815	6.3044	7	17185	2349.98
548	300304	164566592	23.4094	8.1833	2.73878	1.82482	6.3063	8	17216	2358.58
549	301401	165469149	23.4307	8.1882	2.73957	1.82149	6.3081	9	17247	2367.20
550	302500	166375000	23.4521	8.1932	2.74036	1.81818	6.3099	550	17279	2375.83



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	LOG N	1000 $\frac{1}{N}$	LN. N.	D	$\pi D$	$\pi \frac{D^2}{4}$
551	303601	167284151	23.4734	8.1982	2.74116	1.81488	6.3117	55.1	173.10	2384.48
552	304704	168196608	23.4947	8.2031	2.74194	1.81159	6.3135	.2	173.42	2393.14
553	305809	169112377	23.5160	8.2081	2.74273	1.80832	6.3154	.3	173.73	2401.82
554	306916	170031444	23.5372	8.2130	2.74351	1.80505	6.3172	.4	174.04	2410.51
555	308025	170953875	23.5584	8.2180	2.74429	1.80180	6.3190	.5	174.36	2419.22
556	309136	171879616	23.5797	8.2229	2.74507	1.79856	6.3208	.6	174.67	2427.93
557	310249	172808693	23.6008	8.2278	2.74586	1.79533	6.3226	.7	174.99	2436.69
558	311364	173741112	23.6220	8.2327	2.74663	1.79211	6.3244	.8	175.30	2445.45
559	312481	174676879	23.6432	8.2377	2.74741	1.78891	6.3261	.9	175.62	2454.22
560	313600	175616000	23.6643	8.2426	2.74819	1.78571	6.3279	56.0	175.93	2463.01
561	314721	176558481	23.6854	8.2475	2.74896	1.78253	6.3297	.1	176.24	2471.81
562	315844	177504328	23.7065	8.2524	2.74974	1.77936	6.3315	.2	176.56	2480.63
563	316969	178453547	23.7276	8.2573	2.75051	1.77620	6.3333	.3	176.87	2489.47
564	318096	179406144	23.7487	8.2621	2.75128	1.77305	6.3351	.4	177.19	2498.32
565	319225	180362125	23.7697	8.2670	2.75205	1.76991	6.3368	.5	177.50	2507.19
566	320356	181321496	23.7908	8.2719	2.75282	1.76678	6.3386	.6	177.81	2516.07
567	321489	182284263	23.8118	8.2768	2.75358	1.76367	6.3404	.7	178.13	2524.97
568	322624	183250432	23.8328	8.2816	2.75435	1.76056	6.3421	.8	178.44	2533.88
569	323761	184220009	23.8537	8.2865	2.75511	1.75747	6.3439	.9	178.76	2542.81
570	324900	185193000	23.8747	8.2913	2.75587	1.75439	6.3456	57.0	179.07	2551.76
571	326041	186169411	23.8956	8.2962	2.75664	1.75131	6.3474	.1	179.39	2560.72
572	327184	187149248	23.9165	8.3010	2.75740	1.74825	6.3491	.2	179.70	2569.70
573	328329	188132517	23.9374	8.3059	2.75815	1.74520	6.3509	.3	180.01	2578.69
574	329476	189119224	23.9583	8.3107	2.75891	1.74216	6.3526	.4	180.33	2587.70
575	330625	190109375	23.9792	8.3156	2.75967	1.73913	6.3544	.5	180.64	2596.72
576	331776	191102976	24.0000	8.3203	2.76042	1.73611	6.3561	.6	180.96	2605.76
577	332929	192100035	24.0208	8.3251	2.76118	1.73310	6.3578	.7	181.27	2614.82
578	334084	193100552	24.0416	8.3300	2.76193	1.73010	6.3596	.8	181.58	2623.89
579	335241	194104539	24.0624	8.3348	2.76268	1.72712	6.3613	.9	181.90	2632.98
580	336400	195112000	24.0832	8.3396	2.76343	1.72414	6.3630	58.0	182.21	2642.08
581	337561	196122941	24.1039	8.3443	2.76418	1.72117	6.3648	.1	182.53	2651.20
582	338724	197137368	24.1247	8.3491	2.76492	1.71821	6.3665	.2	182.84	2660.33
583	339889	198155287	24.1454	8.3539	2.76567	1.71527	6.3682	.3	183.16	2669.48
584	341056	199176704	24.1661	8.3587	2.76641	1.71233	6.3699	.4	183.47	2678.66
585	342225	200201625	24.1868	8.3634	2.76716	1.70940	6.3716	.5	183.78	2687.83
586	343396	201230056	24.2074	8.3682	2.76790	1.70649	6.3733	.6	184.10	2697.01
587	344569	202262003	24.2281	8.3730	2.76864	1.70358	6.3750	.7	184.41	2706.24
588	345744	203297472	24.2487	8.3777	2.76938	1.70068	6.3767	.8	184.73	2715.47
589	346921	204336469	24.2693	8.3825	2.77012	1.69779	6.3784	.9	185.04	2724.71
590	348100	205379000	24.2899	8.3872	2.77085	1.69492	6.3801	59.0	185.35	2733.97
591	349281	206425071	24.3105	8.3919	2.77159	1.69206	6.3818	.1	185.67	2743.25
592	350464	207474688	24.3311	8.3967	2.77232	1.68921	6.3835	.2	185.98	2752.54
593	351649	208527857	24.3516	8.4014	2.77305	1.68634	6.3852	.3	186.30	2761.84
594	352836	209584584	24.3721	8.4061	2.77379	1.68350	6.3869	.4	186.61	2771.17
595	354025	210644875	24.3926	8.4108	2.77452	1.68067	6.3886	.5	186.93	2780.51
596	355216	211708736	24.4131	8.4155	2.77525	1.67785	6.3902	.6	187.24	2789.86
597	356409	212776173	24.4336	8.4202	2.77597	1.67504	6.3919	.7	187.55	2799.23
598	357604	213847192	24.4540	8.4249	2.77670	1.67224	6.3936	.8	187.87	2808.62
599	358801	214921799	24.4745	8.4296	2.77743	1.66945	6.3953	.9	188.18	2818.02
600	360000	216000000	24.4949	8.4343	2.77815	1.66667	6.3969	60.0	188.50	2827.43





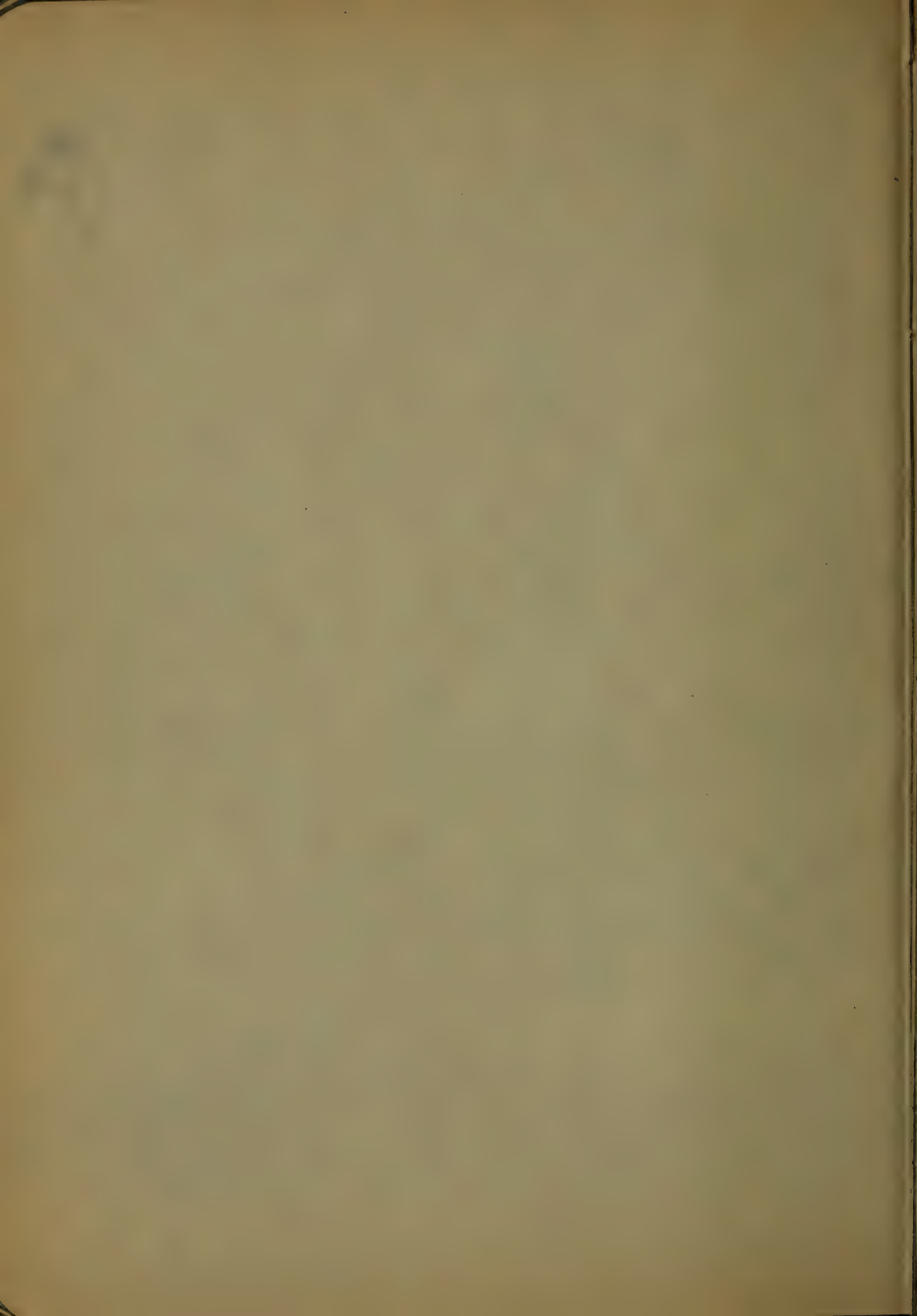


N	N <sup>2</sup>	N <sup>3</sup>	VN	VN	Log. N	1000 $\frac{1}{N}$	Ln. N	D	ND	$\frac{D^2}{N}$
601	361201	217171501	242153	5.4390	2.77857	1.64389	6.5486	60.1	182.41	2836.87
602	362404	218167208	243357	5.4437	2.77960	1.64113	6.4603	2	189.12	2846.31
603	363609	219165227	244561	5.4484	2.78032	1.63837	6.4019	3	195.41	2855.76
604	364816	220165484	245766	5.4530	2.78104	1.63565	6.4036	4	199.76	2865.26
605	366025	221167915	246971	5.4577	2.78176	1.63289	6.4052	5	199.47	2874.75
606	367234	222172506	248177	5.4623	2.78247	1.63017	6.4069	6	199.38	2884.26
607	368444	223179251	249384	5.4670	2.78319	1.62745	6.4085	7	199.70	2893.79
608	369654	224188172	250592	5.4716	2.78390	1.62474	6.4102	8	199.10	2903.35
609	370864	225198289	251799	5.4763	2.78462	1.62204	6.4118	9	199.32	2912.89
610	372074	226210600	252982	5.4809	2.78533	1.61934	6.4135	61.0	199.64	2922.47
611	373284	227225113	254184	5.4856	2.78604	1.61666	6.4151	1	199.45	2932.06
612	374494	228241828	255386	5.4902	2.78675	1.61399	6.4167	2	199.27	2941.66
613	375704	229260745	256588	5.4948	2.78746	1.61132	6.4184	3	199.58	2951.28
614	376914	230281864	257790	5.4994	2.78817	1.60866	6.4200	4	199.39	2960.92
615	378124	231305185	258992	5.5040	2.78888	1.60602	6.4216	5	199.31	2970.57
616	379334	232330706	260193	5.5086	2.78959	1.60338	6.4232	6	199.02	2980.24
617	380544	233358427	261395	5.5132	2.79029	1.60075	6.4249	7	199.54	2989.92
618	381754	234388348	262597	5.5178	2.79099	1.61812	6.4265	8	199.15	2999.62
619	382964	235419469	263799	5.5224	2.79169	1.61551	6.4281	9	199.47	3009.34
620	384174	236452790	264998	5.5270	2.79239	1.61290	6.4297	62.0	199.78	3019.07
621	385384	237488311	266199	5.5316	2.79309	1.61031	6.4313	1	199.59	3028.82
622	386594	238526032	267399	5.5362	2.79379	1.60772	6.4329	2	199.41	3038.58
623	387804	239565953	268599	5.5408	2.79449	1.60514	6.4345	3	199.22	3048.36
624	389014	240608074	269799	5.5453	2.79519	1.60256	6.4362	4	199.04	3058.15
625	390224	241652395	270999	5.5499	2.79589	1.60000	6.4378	5	198.85	3067.95
626	391434	242698916	272199	5.5544	2.79659	1.59744	6.4394	6	198.66	3077.77
627	392644	243747637	273399	5.5590	2.79729	1.59489	6.4409	7	198.48	3087.60
628	393854	244798558	274599	5.5635	2.79799	1.59236	6.4425	8	198.29	3097.46
629	395064	245851679	275799	5.5681	2.79869	1.58983	6.4441	9	198.11	3107.34
630	396274	246907000	276999	5.5726	2.79939	1.58730	6.4457	63.0	197.92	3117.26
631	397484	247964521	278199	5.5772	2.80009	1.58479	6.4473	1	197.74	3127.15
632	398694	249024242	279399	5.5817	2.80079	1.58228	6.4489	2	197.55	3137.07
633	399904	250086163	280599	5.5862	2.80149	1.57976	6.4506	3	197.36	3147.00
634	401114	251150284	281799	5.5907	2.80219	1.57725	6.4522	4	197.18	3156.96
635	402324	252216605	282999	5.5952	2.80289	1.57474	6.4538	5	197.00	3166.92
636	403534	253285126	284199	5.5997	2.80359	1.57223	6.4552	6	196.81	3176.90
637	404744	254355847	285399	5.6043	2.80429	1.56972	6.4568	7	196.63	3186.90
638	405954	255428768	286599	5.6088	2.80499	1.56721	6.4583	8	196.44	3196.92
639	407164	256503889	287799	5.6133	2.80569	1.56470	6.4599	9	196.25	3206.95
640	408374	257581210	288999	5.6178	2.80639	1.56219	6.4615	64.0	196.06	3216.99
641	409584	258660731	290199	5.6223	2.80709	1.55968	6.4630	1	195.88	3227.05
642	410794	259742452	291399	5.6268	2.80779	1.55717	6.4646	2	195.69	3237.15
643	412004	260826373	292599	5.6312	2.80849	1.55466	6.4661	3	195.50	3247.22
644	413214	261912494	293799	5.6357	2.80919	1.55215	6.4677	4	195.31	3257.33
645	414424	263000815	294999	5.6401	2.80989	1.54964	6.4693	5	195.12	3267.45
646	415634	264091336	296199	5.6446	2.81059	1.54713	6.4708	6	194.93	3277.59
647	416844	265184057	297399	5.6490	2.81129	1.54462	6.4723	7	194.74	3287.75
648	418054	266278978	298599	5.6535	2.81199	1.54211	6.4739	8	194.55	3297.92
649	419264	267376099	299799	5.6579	2.81269	1.53960	6.4754	9	194.36	3308.10
650	420474	268475420	300999	5.6624	2.81339	1.53709	6.4770	65.0	194.17	3318.31



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	Ln. N	D	$\pi D$	$\frac{\pi D^2}{4}$
630	428100	27594450	25.1147	8.6448	2.81358	1.53610	6.4785	65.1	204.62	3328.53
632	425104	27167808	25.1343	8.6713	2.81425	1.53374	6.4800	.2	204.43	3338.76
633	424409	273445977	25.1539	8.6757	2.81491	1.53139	6.4816	.3	205.15	3344.01
634	423716	279726664	25.1734	8.6801	2.81558	1.52905	6.4831	.4	205.46	3359.27
635	423025	281011375	25.1930	8.6845	2.81624	1.52672	6.4846	.5	205.77	3369.55
636	422336	282300416	25.2125	8.6890	2.81690	1.52439	6.4862	.6	206.09	3379.85
637	421649	283593993	25.2320	8.6934	2.81757	1.52207	6.4877	.7	206.40	3390.16
638	420964	284890318	25.2515	8.6978	2.81823	1.51974	6.4892	.8	206.72	3400.49
639	420281	286191179	25.2710	8.7022	2.81889	1.51745	6.4907	.9	207.03	3410.84
660	435600	274966000	25.4908	8.7666	2.91954	1.51515	6.4922	66.0	207.35	3421.19
661	436921	280064781	25.5099	8.7710	2.92020	1.51286	6.4938	.1	207.66	3431.57
662	438244	280175288	25.5294	8.7754	2.92086	1.51057	6.4953	.2	207.97	3441.96
663	439569	281434947	25.5488	8.7798	2.92151	1.50830	6.4968	.3	208.28	3452.37
664	440896	282754994	25.5682	8.7841	2.92217	1.50602	6.4983	.4	208.60	3462.79
665	442225	284079625	25.5876	8.7885	2.92282	1.50374	6.4998	.5	208.92	3473.23
666	443556	285408296	25.6070	8.7929	2.92347	1.50150	6.5013	.6	209.23	3483.68
667	444889	286740963	25.6263	8.7973	2.92413	1.49925	6.5028	.7	209.54	3494.15
668	446224	288077632	25.6457	8.7916	2.92478	1.49701	6.5043	.8	209.86	3504.64
669	447561	289418309	25.6650	8.7960	2.92543	1.49477	6.5058	.9	210.17	3515.14
670	448900	290763080	25.6844	8.7903	2.92607	1.49254	6.5073	67.0	210.49	3525.65
671	450241	292111711	25.7037	8.7947	2.92672	1.49031	6.5088	.1	210.80	3536.18
672	451584	293464444	25.7230	8.7990	2.92737	1.48810	6.5103	.2	211.12	3546.73
673	452929	294821217	25.7422	8.7634	2.92802	1.48588	6.5117	.3	211.43	3557.30
674	454276	296181224	25.7615	8.7677	2.92866	1.48368	6.5132	.4	211.74	3567.88
675	455625	297544475	25.7808	8.7721	2.92930	1.48148	6.5147	.5	212.06	3578.47
676	456976	298911776	25.8000	8.7764	2.92995	1.47929	6.5162	.6	212.37	3589.08
677	458329	300283333	25.8192	8.7807	2.93059	1.47711	6.5177	.7	212.69	3599.71
678	459684	301658144	25.8384	8.7850	2.93123	1.47493	6.5192	.8	213.00	3610.35
679	461041	303036199	25.8576	8.7893	2.93187	1.47275	6.5206	.9	213.31	3621.01
680	462400	304418500	25.8768	8.7937	2.93251	1.47059	6.5221	68.0	213.63	3631.68
681	463761	305805121	25.8960	8.7980	2.93315	1.46843	6.5236	.1	213.94	3642.37
682	465124	307195964	25.9151	8.8023	2.93378	1.46628	6.5250	.2	214.26	3653.08
683	466489	308591197	25.9343	8.8066	2.93442	1.46413	6.5265	.3	214.57	3663.80
684	467856	309990864	25.9534	8.8109	2.93506	1.46199	6.5280	.4	214.89	3674.53
685	469225	311394975	25.9725	8.8152	2.93569	1.45985	6.5294	.5	215.20	3685.28
686	470596	312803536	25.9916	8.8194	2.93632	1.45773	6.5309	.6	215.51	3696.05
687	471969	314216573	26.0107	8.8237	2.93696	1.45560	6.5323	.7	215.83	3706.84
688	473344	315634096	26.0298	8.8280	2.93759	1.45349	6.5338	.8	216.14	3717.64
689	474721	317056129	26.0488	8.8323	2.93822	1.45138	6.5352	.9	216.46	3728.45
690	476100	318482680	26.0679	8.8366	2.93885	1.44928	6.5367	69.0	216.77	3739.28
691	477481	319913751	26.0869	8.8408	2.93948	1.44719	6.5381	.1	217.08	3750.13
692	478864	321349344	26.1059	8.8451	2.94011	1.44509	6.5396	.2	217.40	3760.99
693	480249	322789457	26.1249	8.8493	2.94073	1.44300	6.5410	.3	217.71	3771.87
694	481636	324234084	26.1439	8.8536	2.94136	1.44092	6.5425	.4	218.03	3782.76
695	483025	325683225	26.1629	8.8578	2.94198	1.43885	6.5439	.5	218.34	3793.67
696	484416	327136884	26.1818	8.8621	2.94261	1.43678	6.5453	.6	218.66	3804.59
697	485809	328595053	26.2008	8.8663	2.94323	1.43472	6.5468	.7	218.97	3815.54
698	487204	330058732	26.2197	8.8706	2.94386	1.43267	6.5482	.8	219.28	3826.49
699	488601	331527929	26.2386	8.8748	2.94448	1.43062	6.5497	.9	219.60	3837.46
700	490000	333002600	26.2575	8.8790	2.94510	1.42857	6.5511	70.0	219.91	3848.45



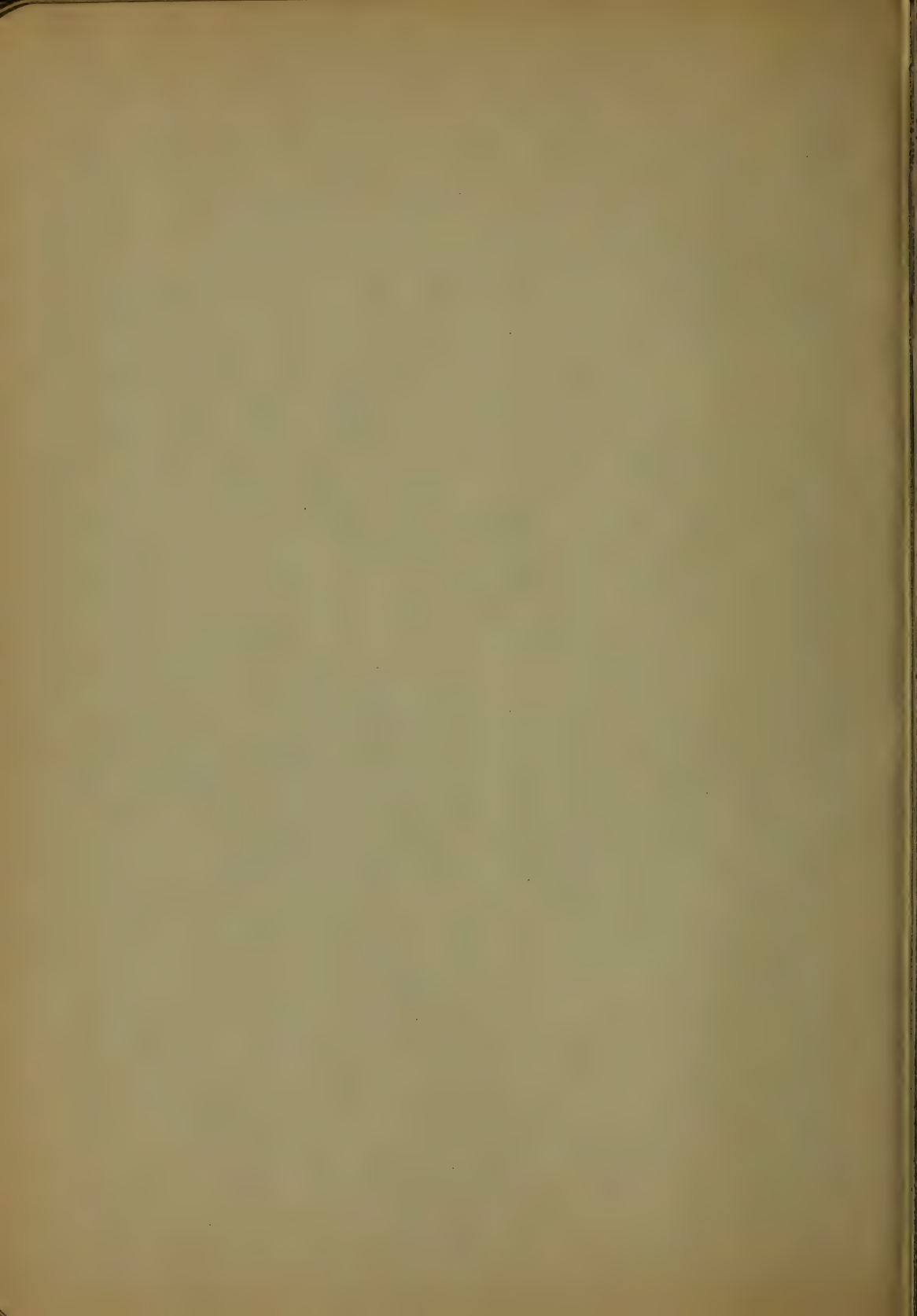




N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log N	1000 $\frac{1}{N}$	Ln. N.	D	nD	$\frac{D^2}{4}$
701	491401	344772101	26.4788	8.8879	2.84372	1.41653	6.43845	701	220.81	3856.45
702	492804	346464088	26.4913	8.8975	2.84634	1.41450	6.5639	2	220.84	3870.47
703	494209	348164877	26.5041	8.9077	2.84896	1.41248	6.6894	3	220.87	3884.51
704	495616	349874468	26.5168	8.9179	2.85157	1.41046	6.8148	4	220.90	3898.56
705	497025	351592861	26.5298	8.9281	2.85419	1.40844	6.9403	5	220.93	3912.63
706	498436	353320056	26.5427	8.9383	2.85680	1.40642	7.0657	6	220.96	3926.70
707	499849	355056053	26.5558	8.9485	2.85942	1.40440	7.1912	7	220.99	3940.80
708	501264	356800852	26.5688	8.9587	2.86203	1.40238	7.3166	8	221.02	3954.92
709	502681	358554453	26.5819	8.9689	2.86465	1.40036	7.4421	9	221.05	3969.05
710	504100	360316856	26.5950	8.9791	2.86726	1.39834	7.5675	710	221.08	3983.19
711	505521	362088061	26.6081	8.9893	2.86987	1.39632	7.6930	1	221.11	3997.35
712	506944	363868068	26.6213	8.9995	2.87248	1.39430	7.8184	2	221.14	4011.53
713	508369	365656877	26.6345	9.0097	2.87509	1.39228	7.9439	3	221.17	4025.72
714	509796	367454488	26.6477	9.0199	2.87770	1.39026	8.0693	4	221.20	4039.93
715	511225	369260899	26.6610	9.0301	2.88031	1.38824	8.1948	5	221.23	4054.16
716	512656	371076112	26.6742	9.0403	2.88292	1.38622	8.3202	6	221.26	4068.40
717	514089	372900127	26.6875	9.0505	2.88553	1.38420	8.4457	7	221.29	4082.65
718	515524	374732944	26.7007	9.0607	2.88814	1.38218	8.5711	8	221.32	4096.92
719	516961	376574563	26.7140	9.0709	2.89075	1.38016	8.6966	9	221.35	4111.20
720	518400	378425084	26.7272	9.0811	2.89336	1.37814	8.8220	720	221.38	4125.50
721	519841	380284507	26.7405	9.0913	2.89597	1.37612	8.9475	1	221.41	4139.82
722	521284	382152832	26.7537	9.1015	2.89858	1.37410	9.0729	2	221.44	4154.16
723	522729	384030059	26.7670	9.1117	2.90119	1.37208	9.1984	3	221.47	4168.51
724	524176	385916188	26.7802	9.1219	2.90380	1.37006	9.3238	4	221.50	4182.88
725	525625	387811219	26.7935	9.1321	2.90641	1.36804	9.4493	5	221.53	4197.26
726	527076	389715252	26.8067	9.1423	2.90902	1.36602	9.5747	6	221.56	4211.65
727	528529	391628287	26.8200	9.1525	2.91163	1.36400	9.7002	7	221.59	4226.06
728	529984	393550324	26.8332	9.1627	2.91424	1.36198	9.8256	8	221.62	4240.48
729	531441	395481363	26.8465	9.1729	2.91685	1.35996	9.9511	9	221.65	4254.92
730	532900	397421404	26.8597	9.1831	2.91946	1.35794	10.0765	730	221.68	4269.37
731	534361	399370447	26.8730	9.1933	2.92207	1.35592	10.2020	1	221.71	4283.83
732	535824	401328492	26.8862	9.2035	2.92468	1.35390	10.3274	2	221.74	4298.30
733	537289	403295539	26.8995	9.2137	2.92729	1.35188	10.4529	3	221.77	4312.78
734	538756	405271588	26.9127	9.2239	2.92990	1.34986	10.5783	4	221.80	4327.28
735	540225	407256639	26.9260	9.2341	2.93251	1.34784	10.7038	5	221.83	4341.79
736	541696	409250692	26.9392	9.2443	2.93512	1.34582	10.8292	6	221.86	4356.31
737	543169	411253747	26.9525	9.2545	2.93773	1.34380	10.9547	7	221.89	4370.84
738	544644	413265804	26.9657	9.2647	2.94034	1.34178	11.0801	8	221.92	4385.38
739	546121	415286863	26.9790	9.2749	2.94295	1.33976	11.2056	9	221.95	4399.93
740	547600	417316924	26.9922	9.2851	2.94556	1.33774	11.3310	740	221.98	4414.50
741	549081	419356087	27.0055	9.2953	2.94817	1.33572	11.4565	1	222.01	4429.08
742	550564	421404252	27.0187	9.3055	2.95078	1.33370	11.5819	2	222.04	4443.68
743	552049	423461419	27.0320	9.3157	2.95339	1.33168	11.7074	3	222.07	4458.29
744	553536	425527588	27.0452	9.3259	2.95600	1.32966	11.8328	4	222.10	4472.91
745	555025	427602759	27.0585	9.3361	2.95861	1.32764	11.9583	5	222.13	4487.54
746	556516	429686932	27.0717	9.3463	2.96122	1.32562	12.0837	6	222.16	4502.18
747	558009	431780107	27.0850	9.3565	2.96383	1.32360	12.2092	7	222.19	4516.83
748	559504	433882284	27.0982	9.3667	2.96644	1.32158	12.3346	8	222.22	4531.49
749	561001	435993463	27.1115	9.3769	2.96905	1.31956	12.4601	9	222.25	4546.16
750	562500	438113644	27.1247	9.3871	2.97166	1.31754	12.5855	750	222.28	4560.85



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	LOG. N	1000 $\frac{1}{N}$	LN. N	D	$\pi D$	$\pi \frac{D^2}{4}$
751	564001	423584751	27.4044	9.0896	2.87564	1.33156	6.6214	75.1	235.93	4429.65
752	565504	425299008	27.4326	9.0937	2.87622	1.32979	6.6227	.2	236.25	4441.46
753	567009	427019577	27.4608	9.0977	2.87679	1.32802	6.6241	.3	236.56	4453.28
754	568516	428746464	27.4891	9.1017	2.87737	1.32626	6.6254	.4	236.88	4465.11
755	570024	430479675	27.4773	9.1057	2.87795	1.32450	6.6267	.5	237.19	4476.97
756	571536	432219216	27.4955	9.1098	2.87852	1.32273	6.6280	.6	237.50	4488.83
757	573049	433978093	27.5136	9.1138	2.87910	1.32100	6.6294	.7	237.82	4500.72
758	574564	435747312	27.5318	9.1178	2.87967	1.31926	6.6307	.8	238.13	4512.62
759	576081	437526879	27.5500	9.1218	2.88024	1.31752	6.6320	.9	238.45	4524.53
760	577600	439317800	27.5681	9.1258	2.88081	1.31579	6.6333	76.0	238.76	4536.46
761	579121	441119181	27.5862	9.1298	2.88138	1.31406	6.6346	.1	239.08	4548.41
762	580644	442931028	27.6043	9.1338	2.88195	1.31234	6.6359	.2	239.39	4560.37
763	582169	444743447	27.6225	9.1378	2.88252	1.31062	6.6373	.3	239.70	4572.34
764	583696	446556434	27.6405	9.1418	2.88309	1.30890	6.6386	.4	240.02	4584.34
765	585225	448370095	27.6586	9.1458	2.88366	1.30719	6.6399	.5	240.33	4596.35
766	586756	450184436	27.6767	9.1498	2.88423	1.30548	6.6412	.6	240.65	4608.37
767	588289	452000463	27.6948	9.1537	2.88480	1.30378	6.6425	.7	240.96	4620.41
768	589824	453818188	27.7128	9.1577	2.88536	1.30208	6.6438	.8	241.27	4632.47
769	591361	455637609	27.7308	9.1617	2.88593	1.30039	6.6451	.9	241.59	4644.56
770	592900	457458720	27.7489	9.1657	2.88649	1.29870	6.6464	77.0	241.90	4656.63
771	594441	459281521	27.7669	9.1696	2.88706	1.29702	6.6477	.1	242.22	4668.73
772	595984	461106016	27.7849	9.1736	2.88762	1.29534	6.6490	.2	242.53	4680.85
773	597529	462932207	27.8029	9.1775	2.88818	1.29366	6.6503	.3	242.85	4692.98
774	599076	464759994	27.8209	9.1815	2.88874	1.29199	6.6516	.4	243.16	4705.13
775	600625	466589475	27.8388	9.1855	2.88930	1.29032	6.6529	.5	243.47	4717.30
776	602176	468420656	27.8568	9.1894	2.88986	1.28866	6.6542	.6	243.79	4729.48
777	603729	469997433	27.8747	9.1933	2.89042	1.28700	6.6554	.7	244.10	4741.65
778	605284	471979908	27.8927	9.1973	2.89098	1.28535	6.6567	.8	244.42	4753.89
779	606841	473964089	27.9106	9.2012	2.89154	1.28370	6.6580	.9	244.73	4766.12
780	608400	475949976	27.9285	9.2052	2.89209	1.28205	6.6593	78.0	245.04	4778.36
781	609961	477937561	27.9464	9.2091	2.89265	1.28041	6.6606	.1	245.36	4790.62
782	611524	479926848	27.9643	9.2130	2.89321	1.27877	6.6619	.2	245.67	4802.90
783	613089	481917837	27.9821	9.2170	2.89376	1.27714	6.6631	.3	245.99	4815.19
784	614656	483910528	28.0000	9.2209	2.89432	1.27551	6.6644	.4	246.30	4827.50
785	616225	485904925	28.0179	9.2248	2.89487	1.27389	6.6657	.5	246.62	4839.82
786	617796	487901024	28.0357	9.2287	2.89542	1.27226	6.6670	.6	246.93	4852.16
787	619369	489908823	28.0535	9.2326	2.89597	1.27065	6.6682	.7	247.24	4864.51
788	620944	491918328	28.0713	9.2365	2.89653	1.26904	6.6695	.8	247.56	4876.88
789	622521	493929539	28.0891	9.2404	2.89708	1.26743	6.6708	.9	247.87	4889.27
790	624100	495942456	28.1069	9.2443	2.89763	1.26582	6.6720	79.0	248.19	4901.67
791	625681	497957081	28.1247	9.2482	2.89818	1.26422	6.6733	.1	248.50	4914.09
792	627264	499973416	28.1425	9.2521	2.89873	1.26263	6.6746	.2	248.81	4926.52
793	628849	501991467	28.1603	9.2560	2.89927	1.26103	6.6758	.3	249.13	4938.97
794	630436	504011234	28.1780	9.2599	2.89982	1.25945	6.6771	.4	249.44	4951.43
795	632025	506032715	28.1957	9.2638	2.90037	1.25786	6.6783	.5	249.76	4963.91
796	633616	508055920	28.2135	9.2677	2.90091	1.25628	6.6796	.6	250.07	4976.41
797	635209	510080859	28.2312	9.2716	2.90146	1.25471	6.6809	.7	250.38	4988.92
798	636804	512107532	28.2489	9.2754	2.90200	1.25313	6.6821	.8	250.70	5001.45
799	638401	514135949	28.2666	9.2793	2.90255	1.25156	6.6834	.9	251.01	5013.99
800	640000	516166000	28.2843	9.2832	2.90309	1.25000	6.6846	80.0	251.33	5026.55



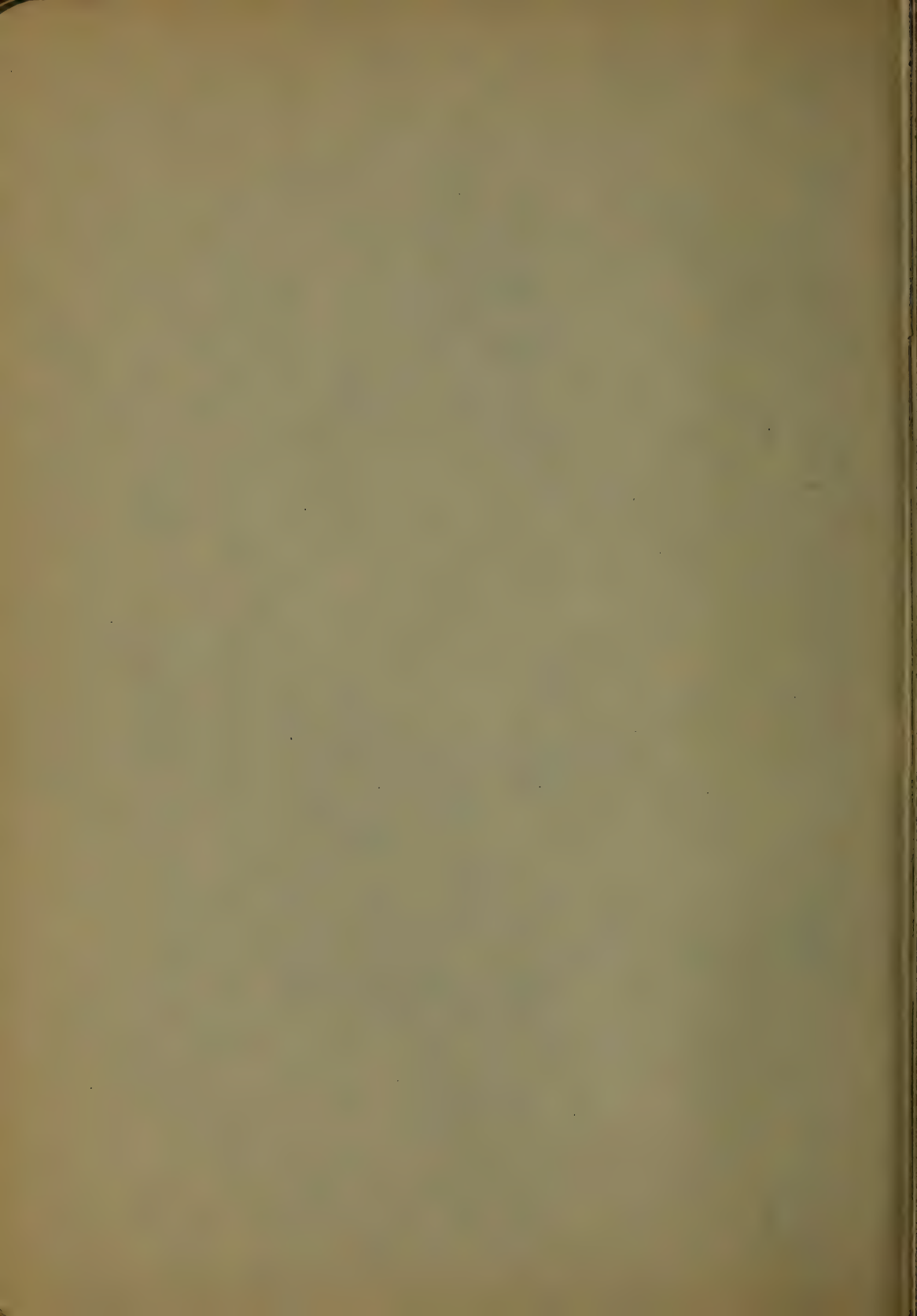




N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	LN. N	D	nD	$\frac{D^2}{4}$
801	641601	513921401	28.3019	9.2870	2.90363	1.24844	6.6859	80.1	251.64	5039.12
802	643204	515846088	28.3196	9.2909	2.90417	1.24688	6.6871	.2	251.66	5041.71
803	644809	517781627	28.3373	9.2948	2.90472	1.24533	6.6884	.3	251.67	5044.31
804	646416	519728444	28.3549	9.2986	2.90526	1.24378	6.6896	.4	251.68	5046.91
805	648025	521686625	28.3725	9.3023	2.90580	1.24224	6.6908	.5	251.69	5049.51
806	649636	523656166	28.3901	9.3063	2.90634	1.24069	6.6921	.6	251.71	5052.11
807	651249	525637943	28.4077	9.3102	2.90687	1.23916	6.6933	.7	251.73	5054.70
808	652864	527631112	28.4253	9.3140	2.90741	1.23762	6.6946	.8	251.74	5057.30
809	654481	529635729	28.4429	9.3179	2.90795	1.23609	6.6958	.9	251.75	5059.90
810	656100	531649800	28.4605	9.3217	2.90849	1.23457	6.6970	81.0	251.77	5062.50
811	657721	533674331	28.4781	9.3255	2.90902	1.23305	6.6983	.1	251.78	5065.10
812	659344	535709328	28.4956	9.3294	2.90956	1.23153	6.6995	.2	251.80	5067.71
813	660969	537754797	28.5132	9.3332	2.91009	1.23001	6.7007	.3	251.81	5070.31
814	662596	539810744	28.5307	9.3370	2.91062	1.22850	6.7020	.4	251.83	5072.92
815	664225	541877175	28.5482	9.3408	2.91116	1.22699	6.7032	.5	251.84	5075.53
816	665856	543954096	28.5657	9.3447	2.91169	1.22549	6.7044	.6	251.85	5078.14
817	667489	546041513	28.5832	9.3485	2.91222	1.22399	6.7056	.7	251.87	5080.75
818	669124	548139432	28.6007	9.3523	2.91275	1.22249	6.7069	.8	251.88	5083.36
819	670761	550247849	28.6182	9.3561	2.91328	1.22100	6.7081	.9	251.90	5085.97
820	672400	552366800	28.6356	9.3599	2.91381	1.21951	6.7093	82.0	251.91	5088.58
821	674041	554496281	28.6531	9.3637	2.91434	1.21803	6.7105	.1	251.92	5091.19
822	675684	556636288	28.6705	9.3675	2.91487	1.21655	6.7117	.2	251.94	5093.80
823	677329	558786727	28.6880	9.3713	2.91540	1.21507	6.7130	.3	251.95	5096.41
824	678976	560947604	28.7054	9.3751	2.91593	1.21359	6.7142	.4	251.97	5099.02
825	680625	563118925	28.7228	9.3789	2.91646	1.21212	6.7154	.5	251.98	5101.63
826	682276	565299796	28.7402	9.3827	2.91698	1.21065	6.7166	.6	252.00	5104.24
827	683929	567489213	28.7576	9.3865	2.91751	1.20919	6.7178	.7	252.01	5106.85
828	685584	569688172	28.7750	9.3902	2.91803	1.20772	6.7190	.8	252.02	5109.46
829	687241	571896689	28.7924	9.3940	2.91855	1.20627	6.7202	.9	252.04	5112.07
830	688900	574115760	28.8097	9.3978	2.91908	1.20482	6.7214	83.0	252.05	5114.68
831	690561	576345381	28.8271	9.4016	2.91960	1.20337	6.7226	.1	252.07	5117.29
832	692224	578585536	28.8444	9.4053	2.92012	1.20192	6.7238	.2	252.08	5119.90
833	693889	580836227	28.8617	9.4091	2.92065	1.20047	6.7250	.3	252.10	5122.51
834	695556	583097456	28.8791	9.4129	2.92117	1.19904	6.7262	.4	252.11	5125.12
835	697225	585369225	28.8964	9.4166	2.92169	1.19760	6.7274	.5	252.12	5127.73
836	698896	587651536	28.9137	9.4204	2.92221	1.19617	6.7286	.6	252.14	5130.34
837	700569	589944389	28.9310	9.4241	2.92273	1.19474	6.7298	.7	252.15	5132.95
838	702244	592247792	28.9482	9.4279	2.92326	1.19332	6.7310	.8	252.17	5135.56
839	703921	594561749	28.9655	9.4316	2.92378	1.19189	6.7322	.9	252.18	5138.17
840	705600	596886260	28.9828	9.4354	2.92430	1.19048	6.7334	84.0	252.19	5140.78
841	707281	599221321	29.0000	9.4391	2.92483	1.18906	6.7346	.1	252.21	5143.39
842	708964	601566948	29.0172	9.4429	2.92535	1.18765	6.7358	.2	252.22	5146.00
843	710649	603923127	29.0345	9.4466	2.92588	1.18624	6.7370	.3	252.24	5148.61
844	712336	606289864	29.0517	9.4503	2.92640	1.18483	6.7382	.4	252.25	5151.22
845	714025	608667165	29.0689	9.4541	2.92693	1.18343	6.7405	.5	252.27	5153.83
846	715716	611055036	29.0861	9.4578	2.92745	1.18203	6.7417	.6	252.28	5156.44
847	717409	613453473	29.1033	9.4615	2.92798	1.18064	6.7429	.7	252.30	5159.05
848	719104	615862488	29.1204	9.4652	2.92850	1.17925	6.7441	.8	252.31	5161.66
849	720801	618282089	29.1376	9.4690	2.92903	1.17786	6.7452	.9	252.33	5164.27
850	722500	620712280	29.1548	9.4727	2.92956	1.17647	6.7464	85.0	252.34	5166.88



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log N	1000 $\frac{1}{N}$	Ln. N.	D	nD	$\pi \frac{D^2}{4}$
851	724201	616295081	29.1719	9.4764	2.92943	1.17509	6.7464	85.1	267.35	6887.86
852	725904	618470208	29.1890	9.4801	2.93044	1.17371	6.7476	.2	267.66	6701.24
853	727609	620650477	29.2062	9.4838	2.93095	1.17233	6.7488	.3	267.98	5714.63
854	729316	622835864	29.2233	9.4875	2.93146	1.17096	6.7499	.4	268.29	5728.03
855	731025	625026375	29.2404	9.4912	2.93197	1.16959	6.7511	.5	268.61	5741.46
856	732736	627222016	29.2575	9.4949	2.93247	1.16822	6.7523	.6	268.92	5754.90
857	734449	629422793	29.2746	9.4986	2.93298	1.16686	6.7534	.7	269.23	5768.35
858	736164	631628712	29.2916	9.5023	2.93349	1.16550	6.7546	.8	269.55	5781.82
859	737881	633839779	29.3087	9.5060	2.93399	1.16414	6.7558	.9	269.86	5795.30
860	739600	636056000	29.3258	9.5097	2.93450	1.16279	6.7569	86.0	270.18	5808.80
861	741321	638277381	29.3428	9.5134	2.93500	1.16144	6.7581	.1	270.49	5822.32
862	743044	640503824	29.3598	9.5171	2.93551	1.16009	6.7593	.2	270.81	5835.85
863	744769	642735647	29.3769	9.5207	2.93601	1.15875	6.7604	.3	271.12	5849.40
864	746496	644972544	29.3939	9.5244	2.93651	1.15741	6.7616	.4	271.43	5862.97
865	748225	647214625	29.4109	9.5281	2.93702	1.15607	6.7627	.5	271.75	5876.55
866	749956	649461896	29.4279	9.5317	2.93752	1.15473	6.7639	.6	272.06	5890.14
867	751689	651714363	29.4449	9.5354	2.93802	1.15340	6.7650	.7	272.38	5903.75
868	753424	653972032	29.4618	9.5391	2.93852	1.15207	6.7662	.8	272.69	5917.38
869	755161	656234909	29.4788	9.5427	2.93902	1.15075	6.7673	.9	273.00	5931.02
870	756900	658503000	29.4958	9.5464	2.93952	1.14943	6.7685	87.0	273.32	5944.68
871	758641	660776311	29.5127	9.5501	2.94002	1.14811	6.7696	.1	273.63	5958.35
872	760384	663054848	29.5296	9.5537	2.94052	1.14679	6.7708	.2	273.95	5972.04
873	762129	665338617	29.5466	9.5574	2.94101	1.14548	6.7719	.3	274.26	5985.75
874	763876	667627624	29.5635	9.5610	2.94151	1.14416	6.7731	.4	274.58	5999.47
875	765625	669921875	29.5804	9.5647	2.94201	1.14286	6.7742	.5	274.89	6013.20
876	767376	672221376	29.5973	9.5683	2.94250	1.14155	6.7754	.6	275.20	6026.96
877	769129	674526133	29.6142	9.5719	2.94300	1.14025	6.7765	.7	275.52	6040.73
878	770884	676836144	29.6311	9.5756	2.94349	1.13895	6.7776	.8	275.83	6054.51
879	772641	679151409	29.6479	9.5792	2.94399	1.13764	6.7788	.9	276.15	6068.31
880	774400	681472000	29.6648	9.5828	2.94448	1.13636	6.7799	88.0	276.46	6082.12
881	776161	683797841	29.6816	9.5865	2.94498	1.13507	6.7811	.1	276.77	6095.95
882	777924	686128968	29.6985	9.5901	2.94547	1.13379	6.7822	.2	277.09	6109.80
883	779689	688465387	29.7153	9.5937	2.94596	1.13250	6.7833	.3	277.40	6123.66
884	781456	690807104	29.7321	9.5973	2.94645	1.13122	6.7845	.4	277.72	6137.54
885	783225	693154125	29.7489	9.6010	2.94694	1.12994	6.7856	.5	278.03	6151.43
886	784996	695506456	29.7658	9.6046	2.94743	1.12867	6.7867	.6	278.35	6165.34
887	786769	697864103	29.7825	9.6082	2.94792	1.12740	6.7878	.7	278.66	6179.27
888	788544	700227072	29.7993	9.6118	2.94841	1.12613	6.7890	.8	278.97	6193.21
889	790321	702595363	29.8161	9.6154	2.94890	1.12486	6.7901	.9	279.29	6207.17
890	792100	704969000	29.8329	9.6190	2.94939	1.12360	6.7912	89.0	279.60	6221.14
891	793881	707347971	29.8496	9.6226	2.94988	1.12233	6.7923	.1	279.92	6235.13
892	795664	709732288	29.8664	9.6262	2.95036	1.12108	6.7935	.2	280.23	6249.13
893	797449	712121957	29.8831	9.6298	2.95085	1.11982	6.7946	.3	280.54	6263.15
894	799236	714516984	29.8998	9.6334	2.95134	1.11857	6.7957	.4	280.86	6277.18
895	801025	716917375	29.9166	9.6370	2.95182	1.11732	6.7968	.5	281.17	6291.24
896	802816	719323136	29.9333	9.6406	2.95231	1.11607	6.7979	.6	281.49	6305.30
897	804609	721734273	29.9500	9.6442	2.95279	1.11483	6.7991	.7	281.80	6319.38
898	806404	724150700	29.9666	9.6477	2.95328	1.11359	6.8002	.8	282.12	6333.48
899	808201	726572699	29.9833	9.6513	2.95376	1.11235	6.8013	.9	282.43	6347.60
900	810000	729000000	30.0000	9.6549	2.95424	1.11111	6.8024	90.0	282.74	6361.73





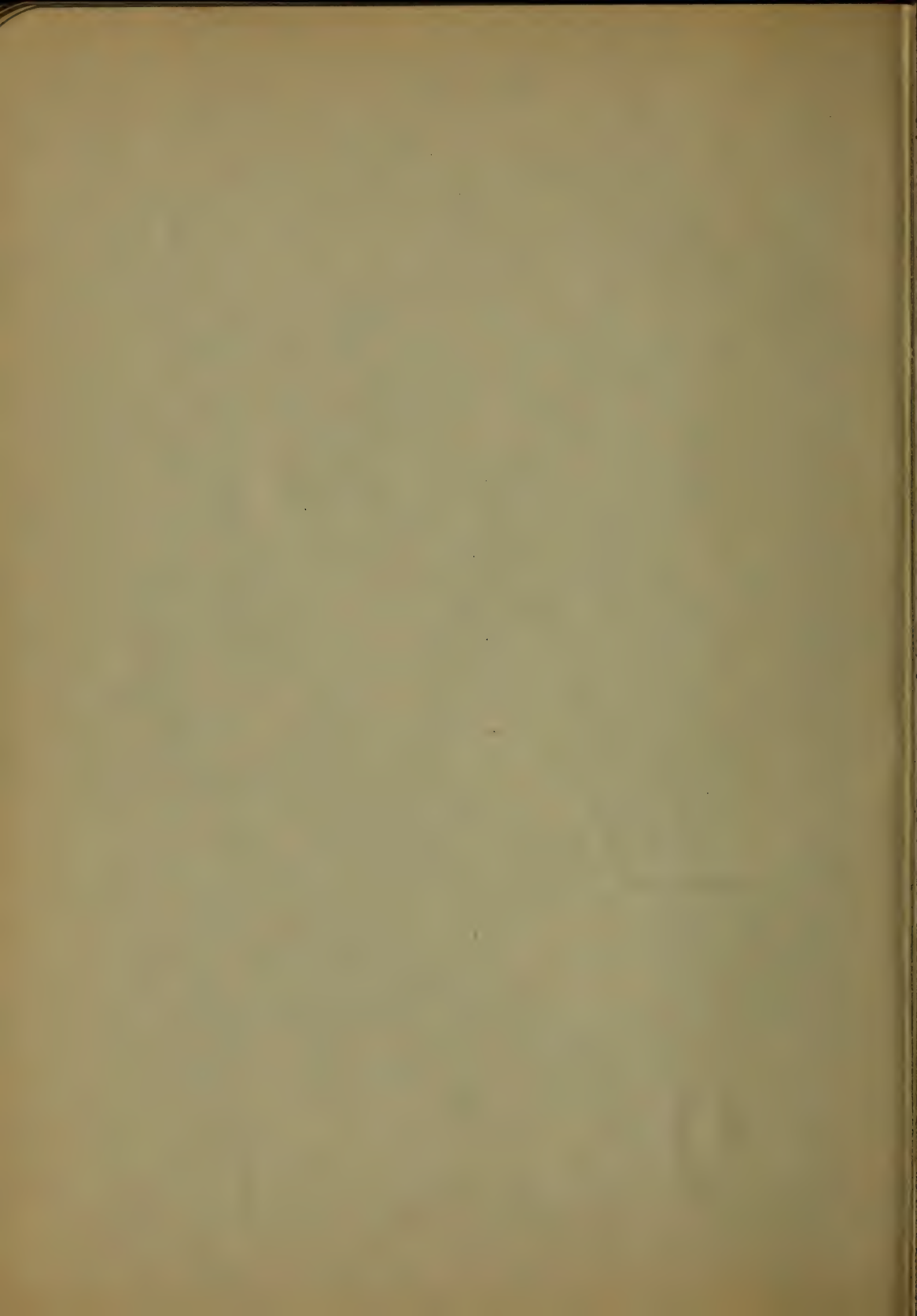


N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log N	1000 $\frac{1}{N}$	Ln N	D	nD	$\frac{D^2}{4}$
901	811801	731433701	30.0167	9.6585	2.95472	1.10982	6.8035	90.1	283.06	6375.87
902	813604	733870808	30.0333	9.6620	2.95521	1.10865	6.8046	.2	283.37	6390.03
903	815409	736314327	30.0500	9.6656	2.95569	1.10742	6.8057	.3	283.67	6404.21
904	817216	738763368	30.0666	9.6692	2.95617	1.10619	6.8068	.4	283.98	6418.40
905	819025	741217432	30.0832	9.6727	2.95665	1.10497	6.8079	.5	284.31	6432.61
906	820836	743677416	30.0998	9.6763	2.95713	1.10375	6.8090	.6	284.63	6446.83
907	822649	746142441	30.1164	9.6799	2.95761	1.10254	6.8101	.7	284.94	6461.07
908	824464	748613512	30.1330	9.6834	2.95809	1.10132	6.8112	.8	285.26	6475.33
909	826281	751089429	30.1496	9.6870	2.95856	1.10011	6.8123	.9	285.57	6489.60
910	828100	753571000	30.1662	9.6905	2.95904	1.09890	6.8134	91.0	285.88	6503.88
911	829921	756058631	30.1828	9.6941	2.95952	1.09769	6.8145	.1	286.20	6518.16
912	831744	758551328	30.1993	9.6976	2.95999	1.09649	6.8156	.2	286.51	6532.50
913	833569	761049497	30.2159	9.7012	2.96047	1.09529	6.8167	.3	286.83	6546.84
914	835396	763553044	30.2324	9.7047	2.96095	1.09409	6.8178	.4	287.14	6561.18
915	837225	766062078	30.2490	9.7082	2.96142	1.09290	6.8189	.5	287.46	6575.65
916	839056	768577529	30.2655	9.7118	2.96190	1.09170	6.8200	.6	287.77	6590.09
917	840889	771098412	30.2820	9.7153	2.96237	1.09051	6.8211	.7	288.08	6604.53
918	842724	773624728	30.2985	9.7188	2.96284	1.08932	6.8222	.8	288.40	6618.94
919	844561	776156489	30.3150	9.7224	2.96332	1.08814	6.8233	.9	288.71	6633.37
920	846400	778694800	30.3315	9.7259	2.96379	1.08696	6.8244	92.0	289.03	6647.81
921	848241	781239661	30.3480	9.7294	2.96426	1.08578	6.8255	.1	289.34	6662.27
922	850084	783790988	30.3645	9.7329	2.96473	1.08460	6.8265	.2	289.65	6676.74
923	851929	786348497	30.3809	9.7364	2.96520	1.08342	6.8276	.3	289.97	6691.03
924	853776	788889024	30.3974	9.7400	2.96567	1.08225	6.8287	.4	290.28	6705.54
925	855625	791453125	30.4138	9.7435	2.96614	1.08108	6.8298	.5	290.60	6720.04
926	857476	794022796	30.4302	9.7470	2.96661	1.07991	6.8309	.6	290.91	6734.60
927	859329	796597983	30.4467	9.7505	2.96708	1.07875	6.8320	.7	291.23	6749.16
928	861184	799178732	30.4631	9.7540	2.96755	1.07759	6.8330	.8	291.54	6763.72
929	863041	801765089	30.4795	9.7575	2.96802	1.07643	6.8341	.9	291.85	6778.31
930	864900	804357000	30.4959	9.7610	2.96849	1.07527	6.8352	93.0	292.17	6792.91
931	866761	806954491	30.5123	9.7645	2.96896	1.07411	6.8363	.1	292.48	6807.52
932	868624	809557568	30.5287	9.7680	2.96942	1.07296	6.8373	.2	292.80	6822.16
933	870489	812166227	30.5450	9.7715	2.96988	1.07181	6.8384	.3	293.11	6836.80
934	872356	814780564	30.5614	9.7750	2.97035	1.07066	6.8395	.4	293.42	6851.47
935	874225	817400575	30.5778	9.7785	2.97081	1.06952	6.8405	.5	293.74	6866.16
936	876096	820026256	30.5941	9.7819	2.97128	1.06838	6.8416	.6	294.05	6880.84
937	877969	822657583	30.6105	9.7854	2.97174	1.06724	6.8427	.7	294.37	6895.55
938	879844	825294572	30.6268	9.7889	2.97220	1.06610	6.8437	.8	294.68	6910.28
939	881721	827937409	30.6431	9.7924	2.97267	1.06496	6.8448	.9	295.00	6925.02
940	883600	830586000	30.6594	9.7959	2.97313	1.06383	6.8459	94.0	295.31	6939.78
941	885481	833240361	30.6757	9.7993	2.97359	1.06270	6.8469	.1	295.62	6954.55
942	887364	835900488	30.6920	9.8028	2.97405	1.06157	6.8480	.2	295.94	6969.34
943	889249	838566407	30.7083	9.8063	2.97451	1.06045	6.8491	.3	296.25	6984.16
944	891136	841238124	30.7246	9.8097	2.97497	1.05932	6.8501	.4	296.57	6998.97
945	893025	843915625	30.7409	9.8132	2.97543	1.05820	6.8512	.5	296.88	7013.80
946	894916	846598926	30.7571	9.8167	2.97589	1.05708	6.8522	.6	297.19	7028.65
947	896809	849288023	30.7734	9.8201	2.97635	1.05597	6.8533	.7	297.51	7043.52
948	898704	851982928	30.7896	9.8236	2.97681	1.05485	6.8544	.8	297.82	7058.40
949	899601	854684649	30.8058	9.8270	2.97727	1.05374	6.8554	.9	298.14	7073.30
950	901500	857393000	30.8221	9.8305	2.97772	1.05263	6.8565	95.0	298.45	7088.22



N	N <sup>2</sup>	N <sup>3</sup>	$\sqrt{N}$	$\sqrt[3]{N}$	Log. N	1000 $\frac{1}{N}$	Ln. N	D	$\pi D$	$\pi \frac{D^2}{4}$
951	904401	850085351	30.8383	9.8339	2.97818	1.05152	6.8575	95.1	298.77	7103.15
952	906304	852801408	30.8545	9.8374	2.97864	1.05042	6.8586	.2	299.05	7114.09
953	908209	855523177	30.8707	9.8408	2.97909	1.04932	6.8596	.3	299.31	7125.06
954	910116	858250644	30.8869	9.8443	2.97955	1.04822	6.8607	.4	299.59	7136.03
955	912025	860983575	30.9031	9.8477	2.98000	1.04712	6.8617	.5	300.2	7147.03
956	913936	863722816	30.9192	9.8511	2.98046	1.04603	6.8628	.6	300.47	7158.04
957	915849	866467493	30.9354	9.8546	2.98091	1.04493	6.8638	.7	300.65	7169.06
958	917764	869217912	30.9516	9.8580	2.98137	1.04384	6.8648	.8	300.96	7180.10
959	919681	871974079	30.9677	9.8614	2.98182	1.04275	6.8659	.9	301.28	7191.16
960	921600	874736000	30.9839	9.8648	2.98227	1.04167	6.8669	96.0	301.59	7202.25
961	923521	877503681	31.0000	9.8683	2.98272	1.04058	6.8680	.1	301.91	7213.32
962	925444	880277728	31.0161	9.8717	2.98318	1.03949	6.8690	.2	302.22	7224.42
963	927369	883058347	31.0322	9.8751	2.98363	1.03842	6.8701	.3	302.54	7235.54
964	929296	885845444	31.0483	9.8785	2.98408	1.03734	6.8711	.4	302.85	7246.67
965	931225	888639125	31.0644	9.8819	2.98453	1.03627	6.8721	.5	303.16	7257.82
966	933156	891439396	31.0805	9.8854	2.98498	1.03520	6.8732	.6	303.48	7268.99
967	935089	894246263	31.0966	9.8888	2.98543	1.03413	6.8742	.7	303.79	7280.17
968	937024	897059728	31.1127	9.8922	2.98588	1.03306	6.8753	.8	304.11	7291.37
969	938961	900085209	31.1288	9.8956	2.98632	1.03199	6.8763	.9	304.42	7302.58
970	940900	902830000	31.1448	9.8990	2.98677	1.03093	6.8773	97.0	304.73	7313.81
971	942841	905581611	31.1609	9.9024	2.98722	1.02987	6.8783	.1	305.05	7325.06
972	944784	908339048	31.1769	9.9058	2.98767	1.02881	6.8794	.2	305.36	7336.32
973	946729	911102317	31.1929	9.9092	2.98811	1.02775	6.8804	.3	305.68	7347.59
974	948676	913871424	31.2090	9.9126	2.98855	1.02669	6.8814	.4	305.99	7358.88
975	950625	916646375	31.2250	9.9160	2.98900	1.02564	6.8824	.5	306.31	7370.19
976	952576	919428176	31.2410	9.9194	2.98944	1.02458	6.8835	.6	306.62	7381.51
977	954529	922216833	31.2570	9.9227	2.98989	1.02353	6.8845	.7	306.93	7392.85
978	956484	925013352	31.2730	9.9261	2.99034	1.02247	6.8855	.8	307.25	7404.21
979	958441	927816739	31.2890	9.9295	2.99078	1.02142	6.8865	.9	307.56	7415.58
980	960400	930627000	31.3050	9.9329	2.99123	1.02036	6.8876	98.0	307.88	7426.96
981	962361	933444161	31.3209	9.9363	2.99167	1.01931	6.8886	.1	308.19	7438.37
982	964324	936267128	31.3369	9.9396	2.99211	1.01825	6.8896	.2	308.50	7449.78
983	966289	939096007	31.3528	9.9430	2.99255	1.01720	6.8906	.3	308.82	7461.22
984	968256	941931804	31.3688	9.9464	2.99300	1.01615	6.8916	.4	309.13	7472.66
985	970225	944774625	31.3847	9.9497	2.99344	1.01510	6.8926	.5	309.45	7484.13
986	972196	947624486	31.4006	9.9531	2.99388	1.01405	6.8937	.6	309.76	7495.61
987	974169	950481393	31.4166	9.9565	2.99432	1.01300	6.8947	.7	310.08	7507.11
988	976144	953345352	31.4325	9.9598	2.99476	1.01195	6.8957	.8	310.39	7518.62
989	978121	956216369	31.4485	9.9632	2.99520	1.01090	6.8967	.9	310.70	7530.14
990	980100	959094400	31.4644	9.9666	2.99564	1.00985	6.8977	99.0	311.02	7541.69
991	982081	961979451	31.4802	9.9699	2.99607	1.00880	6.8987	.1	311.33	7553.25
992	984064	964871528	31.4960	9.9733	2.99651	1.00775	6.8997	.2	311.65	7564.82
993	986049	967770637	31.5119	9.9766	2.99695	1.00670	6.9007	.3	311.96	7576.41
994	988036	970676784	31.5278	9.9800	2.99739	1.00565	6.9017	.4	312.27	7588.02
995	990025	973590975	31.5436	9.9833	2.99782	1.00460	6.9027	.5	312.59	7599.64
996	992016	976513216	31.5595	9.9866	2.99826	1.00355	6.9037	.6	312.90	7611.28
997	994009	979443513	31.5753	9.9900	2.99870	1.00250	6.9047	.7	313.22	7622.93
998	996004	982381872	31.5911	9.9933	2.99913	1.00145	6.9057	.8	313.53	7634.60
999	998001	985328299	31.6069	9.9967	2.99957	1.00040	6.9068	.9	313.85	7646.28
1000	1000000	1000000000	31.6227	10.0000		1.00000	6.9078	100.0	314.16	7658.00







## NATURAL

## SINES. COSINES. TANGENTS. COTANGENTS.

## SECANTS AND COSECANTS,

FOR ANGLES FROM  $0^{\circ}$  TO  $90^{\circ}$  ADVANCING BY  $10'$ .

ALSO CORRESPONDING ARCS FOR THE UNIT OF RADIUS.

FIND IN TABLE:

SIN.  $25^{\circ}40' = .43314$ ; TANG.  $12^{\circ}20' = .21865$ ; SEC  $29^{\circ}30' = 1.15277$ ;COSIN.  $56^{\circ}30' = .55194$ ; COTANG.  $73^{\circ}10' = .30255$ ; COSEC.  $82^{\circ}0' = 1.0098$ ;

FOR INTERMEDIATE ANGLES MULTIPLY THE DIFFERENCE OF THE TWO NEAREST 10 MINUTES WITH THE SUPERNUMERARY MINUTES AND FOR SIN. TANG. SECANT ADD THE RESULT AND FOR COSIN. COTANG. &amp; COSEC. SUBTRACT THIS RESULT FROM THE CORRESPONDING FUNCTION:

FIND: SIN  $20^{\circ}46' = .35456$  — COSIN.  $36^{\circ}29' = .80403$  —DIFFERENCE BETWEEN  $20^{\circ}40'$  AND  $20^{\circ}50' = 27.2$  DIFF. OF  $36^{\circ}20'$  AND  $36^{\circ}30' = 17.2$  $6 \times 27.2 = 163.2 \div 10 = 16.32$ ;  $9 \times 17.2 = 154.8 \div 10 = 15.48$  $16.32 + 16.32 = 32.64$  $15.48 + 15.48 = 30.96$ 

ANGLE °	ARC '	SINE	COSINE	TANG.	COTANG.	SECANT	COSECANT	ARC '	ANGLE °
0	0	.0000	1.0000	.0000	$\infty$	1.0000	$\infty$	1.5708	0
	10	.0029	.99999	.002909	343.774	1.0000	343.775	1.5679	30
	20	.00581	.00581	.00582	171.885	1.00002	171.888	1.5650	40
	30	.00872	.00872	.00873	114.588	1.00004	114.593	1.5621	30
	40	.01163	.01163	.01164	85.937	1.00007	85.946	1.5592	20
	50	.01454	.01454	.01455	68.750	1.00011	68.757	1.5563	10
1	0	.0175	.01754	.01745	57.2899	1.00015	57.2986	1.5533	0
	10	.0204	.02036	.02036	49.1038	1.00021	49.1141	1.5504	50
	20	.0233	.02327	.02328	42.9641	1.00027	42.9757	1.5475	40
	30	.0262	.02618	.02619	38.1885	1.00034	38.2016	1.5446	30
	40	.0291	.02909	.02909	34.3677	1.00042	34.3823	1.5417	20
	50	.0320	.03199	.03199	31.2416	1.00051	31.2576	1.5388	10
2	0	.0349	.03487	.03482	28.6363	1.00061	28.6537	1.5359	0
	10	.0378	.03781	.03783	26.4316	1.00072	26.4505	1.5330	50
	20	.0407	.04071	.04075	24.5418	1.00083	24.5611	1.5301	40
	30	.0436	.04362	.04366	22.9038	1.00095	22.9256	1.5271	30
	40	.0465	.04653	.04655	21.4704	1.00108	21.4957	1.5243	20
	50	.0494	.04943	.04944	20.2056	1.00122	20.2308	1.5213	10
3	0	.0524	.05234	.05231	19.0317	1.00137	19.0672	1.5184	0
	10	.0553	.05524	.05523	18.0749	1.00153	18.1022	1.5155	50
	20	.0582	.05814	.05824	17.1693	1.00169	17.1933	1.5126	40
	30	.0611	.06105	.06116	16.3498	1.00187	16.3804	1.5097	30
	40	.0640	.06395	.06408	15.6048	1.00205	15.6383	1.5068	20
	50	.0669	.06685	.06700	14.9244	1.00224	14.9579	1.5039	10
4	0	.0698	.06975	.06983	14.3007	1.00244	14.3359	1.5010	0
	10	.0727	.07266	.07285	13.7267	1.00265	13.7631	1.4981	50
	20	.0756	.07556	.07577	13.1969	1.00287	13.2347	1.4951	40
	30	.0785	.07846	.07870	12.7062	1.00309	12.7455	1.4923	30
	40	.0814	.08136	.08163	12.2505	1.00333	12.2913	1.4893	20
	50	.0844	.08436	.08456	11.8262	1.00357	11.8684	1.4864	10
5	0	.0873	.08714	.08744	11.4300	1.00382	11.4737	1.4835	0
	10	.0902	.09005	.09042	11.0594	1.00408	11.1045	1.4806	50
	20	.0931	.09295	.09335	10.7119	1.00435	10.7585	1.4777	40
	30	.0960	.09583	.09629	10.3854	1.00463	10.4334	1.4748	30
	40	.0989	.09874	.09923	10.0750	1.00491	10.1238	1.4719	20
	50	.1018	.10164	.10216	9.7822	1.00521	9.8342	1.4690	10
ANGLE °	ARC '	COS.	SINE	COTANG.	TANG.	COSEC.	SEC.	ARC '	ANGLE °

ARCS CORRESPOND WITH ANGLES.



## FOR FUNCTIONS FROM

6° TO 14° 50' READ DOWNWARD

AND

FOR 75° 10' TO 84° FROM BOTTOM UPWARD.

ANGLE 0 1		ARC.	SINE.	COSINE	TANG.	COTANG.	SECANT	COSEC.	ARC.	ANGLE 1 50	
6	0	.1047	.10453	.99452	.10510	9.51436	1.0055	9.56677	1.4661	0 84	
	10	.1076	.10742	.99421	.10805	9.25530	1.0052	9.30917	1.4632	50	
	20	.1105	.11031	.99389	.11099	9.00983	1.0061	9.06518	1.4603	40	
	30	.1134	.11320	.99357	.11394	8.7768	1.0065	8.8336	1.4573	30	
	40	.1164	.11609	.99324	.11688	8.5553	1.0068	8.61379	1.4544	20	
	50	.1193	.11898	.99289	.11983	8.3496	1.0072	8.4046	1.4515	10	
7	0	.1222	.12187	.99255	.12278	8.1443	1.0075	8.2055	1.4486	0 83	
	10	.1251	.12476	.99218	.12574	7.9530	1.0078	8.0166	1.4457	50	
	20	.1280	.12764	.99182	.12869	7.7703	1.0083	7.8344	1.4428	40	
	30	.1309	.13053	.99145	.13165	7.5957	1.0086	7.6613	1.4399	30	
	40	.1338	.13341	.99106	.13461	7.4287	1.0090	7.4957	1.4370	20	
	50	.1367	.13629	.99067	.13757	7.2687	1.0094	7.3372	1.4341	10	
8	0	.1396	.13917	.99029	.14054	7.11537	1.0098	7.18229	1.4312	0 82	
	10	.1425	.14205	.98996	.14351	6.98623	1.0102	7.05962	1.4283	50	
	20	.1454	.14493	.98964	.14648	6.8269	1.0107	6.89979	1.4254	40	
	30	.1484	.14781	.98922	.14945	6.69115	1.0111	6.76546	1.4224	30	
	40	.1512	.15068	.98885	.15243	6.5605	1.0116	6.63633	1.4195	20	
	50	.1542	.15356	.98844	.15540	6.4348	1.0120	6.51208	1.4166	10	
9	0	.1571	.15643	.98768	.15833	6.31375	1.0123	6.39245	1.4137	0 81	
	10	.1600	.15931	.98723	.16137	6.18703	1.0129	6.27719	1.4108	50	
	20	.1629	.16218	.98676	.16435	6.03404	1.0134	6.16606	1.4079	40	
	30	.1658	.16505	.98628	.16734	5.9757	1.0139	6.05889	1.4050	30	
	40	.1687	.16792	.98580	.17033	5.8708	1.0144	5.95536	1.4021	20	
	50	.1716	.17078	.98531	.17333	5.7694	1.0149	5.85539	1.3992	10	
10	0	.1745	.17365	.98481	.17633	5.67128	1.0154	5.75877	1.3963	0 80	
	10	.1774	.17651	.98429	.17933	5.5764	1.0159	5.6653	1.3934	50	
	20	.1804	.17937	.98378	.18233	5.4845	1.0165	5.5749	1.3904	40	
	30	.1833	.18224	.98326	.18534	5.3955	1.0170	5.4874	1.3875	30	
	40	.1862	.18509	.98272	.18836	5.3093	1.0176	5.4026	1.3846	20	
	50	.1891	.18795	.98218	.19136	5.2256	1.0182	5.3205	1.3817	10	
11	0	.1920	.19081	.98163	.19438	5.1445	1.0187	5.2408	1.3788	0 79	
	10	.1949	.19366	.98109	.19740	5.0658	1.0193	5.1636	1.3759	50	
	20	.1978	.19652	.98050	.20043	4.9894	1.0199	5.0886	1.3730	40	
	30	.2007	.19937	.97993	.20345	4.91515	1.0205	5.0158	1.3701	30	
	40	.2036	.20222	.97934	.20648	4.84300	1.0211	4.9452	1.3672	20	
	50	.2065	.20506	.97875	.20952	4.7728	1.0217	4.8765	1.3643	10	
12	0	.2094	.20791	.97815	.21256	4.7046	1.0223	4.8097	1.3614	0 78	
	10	.2123	.21075	.97754	.21559	4.6382	1.0229	4.7448	1.3584	50	
	20	.2153	.21357	.97692	.21865	4.5736	1.0236	4.6817	1.3555	40	
	30	.2182	.21644	.97629	.22170	4.5107	1.0243	4.6202	1.3526	30	
	40	.2211	.21928	.97566	.22475	4.4494	1.0249	4.5604	1.3497	20	
	50	.2240	.22212	.97502	.22781	4.3897	1.0256	4.5022	1.3468	10	
13	0	.2269	.22495	.97437	.23087	4.3318	1.0263	4.4454	1.3439	0 77	
	10	.2298	.22778	.97371	.23393	4.2767	1.0270	4.3901	1.3410	50	
	20	.2327	.23062	.97305	.23700	4.2198	1.0277	4.3362	1.3381	40	
	30	.2356	.23344	.97237	.24005	4.16529	1.0284	4.28365	1.3352	30	
	40	.2385	.23627	.97168	.24316	4.11256	1.0291	4.23239	1.3323	20	
	50	.2414	.23909	.97099	.24624	4.06107	1.0298	4.18237	1.3294	10	
14	0	.2443	.24192	.97029	.24933	4.01078	1.03061	4.13356	1.3264	0 76	
	10	.2473	.24474	.96958	.25242	3.96165	1.03137	4.08591	1.3235	50	
	20	.2502	.24756	.96887	.25551	3.91364	1.0321	4.03938	1.3206	40	
	30	.2531	.25038	.96815	.25862	3.8667	1.0329	3.99392	1.3177	30	
	40	.2560	.25319	.96742	.26172	3.8208	1.0336	3.9495	1.3148	20	
	50	.2589	.25600	.96667	.26483	3.7759	1.0345	3.90613	1.3119	10 75	
0 1	ANGLE	ARC.	COSINE	SINE	COTANG	TANG.	COSEC.	SECAN.	ARC.	1 0	ANGLE







15° TO 23° READ DOWNWARD AND FROM 66° 10' TO 75° FROM BOTTOM UP

ANGLE °	ARC.	SINE	COSINE	TANG.	COTANG.	SECANT	COSEC.	ARC.	ANGLE °
15	0	.2618	.96592	.46630	2.14301	1.03528	3.86370	1.3090	0
	10	.2647	.96517	.47107	2.12107	1.03609	3.82222	1.3061	50
	20	.2675	.96440	.47584	2.09914	1.03691	3.78166	1.3032	40
	30	.2705	.96363	.48061	2.07733	1.03774	3.74197	1.3003	30
	40	.2734	.96285	.48538	2.05557	1.03858	3.70315	1.2974	20
	50	.2763	.96206	.49015	2.03380	1.03944	3.66515	1.2945	10
16	0	.2793	.96126	.49492	2.01204	1.04030	3.62745	1.2915	0
	10	.2822	.96046	.50000	1.99029	1.04117	3.59154	1.2886	50
	20	.2851	.95964	.50500	1.96854	1.04206	3.55587	1.2857	40
	30	.2880	.95882	.51000	1.94679	1.04295	3.52034	1.2828	30
	40	.2909	.95799	.51500	1.92504	1.04385	3.48671	1.2799	20
	50	.2938	.95715	.52000	1.90329	1.04477	3.45317	1.2770	10
17	0	.2967	.95631	.52500	1.88154	1.04569	3.42030	1.2741	0
	10	.2996	.95545	.53000	1.85979	1.04663	3.38808	1.2712	50
	20	.3025	.95459	.53500	1.83804	1.04757	3.35649	1.2683	40
	30	.3054	.95372	.54000	1.81629	1.04853	3.32550	1.2654	30
	40	.3083	.95284	.54500	1.79454	1.04950	3.29512	1.2625	20
	50	.3113	.95195	.55000	1.77279	1.05047	3.26531	1.2595	10
18	0	.3142	.95106	.55500	1.75104	1.05146	3.23607	1.2566	0
	10	.3171	.95015	.56000	1.72929	1.05246	3.20736	1.2537	50
	20	.3200	.94924	.56500	1.70754	1.05347	3.17919	1.2508	40
	30	.3229	.94832	.57000	1.68579	1.05449	3.15155	1.2479	30
	40	.3258	.94739	.57500	1.66404	1.05552	3.12437	1.2450	20
	50	.3287	.94646	.58000	1.64229	1.05657	3.09774	1.2421	10
19	0	.3316	.94552	.58500	1.62054	1.05762	3.07155	1.2392	0
	10	.3345	.94457	.59000	1.59879	1.05869	3.04584	1.2363	50
	20	.3374	.94363	.59500	1.57704	1.05976	3.02057	1.2334	40
	30	.3403	.94268	.60000	1.55529	1.06085	2.99574	1.2305	30
	40	.3432	.94173	.60500	1.53354	1.06195	2.97134	1.2275	20
	50	.3462	.94078	.61000	1.51179	1.06306	2.94737	1.2246	10
20	0	.3491	.93983	.61500	1.49004	1.06418	2.92380	1.2217	0
	10	.3520	.93887	.62000	1.46829	1.06531	2.89963	1.2188	50
	20	.3549	.93792	.62500	1.44654	1.06645	2.87786	1.2159	40
	30	.3578	.93696	.63000	1.42479	1.06761	2.85545	1.2130	30
	40	.3607	.93599	.63500	1.40304	1.06878	2.83342	1.2101	20
	50	.3638	.93503	.64000	1.38129	1.06995	2.81175	1.2072	10
21	0	.3665	.93407	.64500	1.35954	1.07115	2.79048	1.2043	0
	10	.3694	.93311	.65000	1.33779	1.07235	2.76946	1.2014	50
	20	.3723	.93215	.65500	1.31604	1.07356	2.74881	1.1985	40
	30	.3752	.93119	.66000	1.29429	1.07479	2.72850	1.1956	30
	40	.3782	.93023	.66500	1.27254	1.07602	2.70851	1.1926	20
	50	.3811	.92927	.67000	1.25079	1.07727	2.68884	1.1897	10
22	0	.3840	.92831	.67500	1.22904	1.07853	2.66947	1.1868	0
	10	.3869	.92735	.68000	1.20729	1.07981	2.65039	1.1839	50
	20	.3898	.92639	.68500	1.18554	1.08109	2.63162	1.1810	40
	30	.3927	.92543	.69000	1.16379	1.08239	2.61313	1.1781	30
	40	.3956	.92447	.69500	1.14204	1.08370	2.59491	1.1752	20
	50	.3985	.92351	.70000	1.12029	1.08503	2.57697	1.1723	10
23	0	.4014	.92255	.70500	1.09854	1.08636	2.55930	1.1694	0
	10	.4043	.92159	.71000	1.07679	1.08771	2.54189	1.1664	50
	20	.4072	.92063	.71500	1.05504	1.08907	2.52474	1.1636	40
	30	.4102	.91967	.72000	1.03329	1.09044	2.50794	1.1606	30
	40	.4131	.91871	.72500	1.01154	1.09183	2.49148	1.1577	20
	50	.4160	.91775	.73000	0.98979	1.09323	2.47547	1.1548	10
0	1	ARC.	COSINE	SINE	COTANG.	TANG.	COSEC.	SECANT	ARC.
ANGLE	1								ANGLE



## FOUR FUNCTIONS FROM

24° TO 32° 30' READ DOWNWARD AND FOR 57' 10" TO 66° 40" BOTTOM UP.

ANGLE °	1	ARC.	SINE	COSINE	TANG.	COTANG.	SECANT	COSEC.	ARC.	1	0
24	0	.4189	.40674	.91555	.44523	2.24604	1.09464	2.45859	1.1519	0	66
	10	.4218	.40939	.91236	.44872	2.22857	1.09606	2.44264	1.1490	50	
	20	.4247	.41205	.91116	.45222	2.21132	1.09750	2.42692	1.1461	40	
	30	.4276	.41469	.90996	.45573	2.19429	1.09895	2.41142	1.1432	30	
	40	.4305	.41734	.90875	.45924	2.17749	1.10041	2.39613	1.1403	20	
	50	.4334	.41998	.90753	.46277	2.16089	1.10189	2.38106	1.1374	10	
25	0	.4363	.422618	.90631	.46631	2.14451	1.10338	2.36620	1.1345	0	65
	10	.4392	.42525	.90508	.46985	2.12832	1.10488	2.35154	1.1316	50	
	20	.4421	.42788	.90384	.47341	2.11233	1.10640	2.33702	1.1288	40	
	30	.4451	.43051	.90259	.47698	2.09654	1.10793	2.32282	1.1257	30	
	40	.4480	.43314	.90133	.48055	2.08094	1.10947	2.30875	1.1228	20	
	50	.4509	.43576	.90007	.48414	2.06553	1.11103	2.29487	1.1199	10	
26	0	.4538	.43837	.89879	.48773	2.05030	1.11255	2.28117	1.1170	0	64
	10	.4567	.44098	.89752	.49134	2.03526	1.11400	2.26767	1.1141	50	
	20	.4596	.44369	.89623	.49496	2.02038	1.11557	2.25432	1.1112	40	
	30	.4625	.44619	.89493	.49858	2.00557	1.11708	2.24116	1.1082	30	
	40	.4654	.44879	.89363	.50222	1.99116	1.11903	2.22817	1.1054	20	
	50	.4683	.45139	.89232	.50587	1.97681	1.12067	2.21584	1.1025	10	
27	0	.4712	.45299	.89101	.50953	1.96261	1.12233	2.20269	1.0996	0	63
	10	.4741	.45558	.88968	.51319	1.94857	1.12400	2.18909	1.0968	50	
	20	.4771	.45816	.88835	.51687	1.93470	1.12568	2.17786	1.0937	40	
	30	.4800	.46175	.88701	.52057	1.92098	1.12738	2.16588	1.0908	30	
	40	.4829	.46433	.88566	.52427	1.90742	1.12910	2.15366	1.0879	20	
	50	.4858	.46690	.88431	.52798	1.89399	1.13083	2.14178	1.0850	10	
28	0	.4887	.46947	.88295	.53171	1.88073	1.13257	2.13005	1.0821	0	62
	10	.4916	.47204	.88158	.53555	1.86760	1.13433	2.11847	1.0794	50	
	20	.4945	.47460	.88020	.53919	1.85462	1.13610	2.10703	1.0763	40	
	30	.4974	.47716	.87882	.54296	1.84174	1.13787	2.09574	1.0734	30	
	40	.5003	.47971	.87743	.54673	1.82906	1.13970	2.08459	1.0705	20	
	50	.5032	.48226	.87603	.55052	1.81649	1.14152	2.07356	1.0676	10	
29	0	.5061	.48484	.87462	.55431	1.80405	1.14335	2.06266	1.0647	0	61
	10	.5091	.48735	.87321	.55812	1.79174	1.14521	2.05191	1.0617	50	
	20	.5120	.48989	.87178	.56194	1.77953	1.14707	2.04127	1.0588	40	
	30	.5149	.49242	.87036	.56577	1.76739	1.14896	2.03077	1.0559	30	
	40	.5178	.49495	.86892	.56962	1.75536	1.15085	2.02039	1.0530	20	
	50	.5207	.49748	.86748	.57348	1.74375	1.15277	2.01014	1.0501	10	
30	0	.5236	.50000	.86603	.57735	1.73205	1.15470	2.00000	1.0472	0	60
	10	.5265	.50252	.86457	.58124	1.72047	1.15665	1.98998	1.0443	50	
	20	.5294	.50503	.86310	.58513	1.70901	1.15861	1.98008	1.0414	40	
	30	.5323	.50754	.86163	.58905	1.69766	1.16059	1.97029	1.0385	30	
	40	.5352	.51004	.86015	.59297	1.68643	1.16259	1.96062	1.0356	20	
	50	.5381	.51254	.85866	.59691	1.67529	1.16460	1.95106	1.0326	10	
31	0	.5411	.51504	.85717	.60086	1.66428	1.16663	1.94160	1.0297	0	59
	10	.5440	.51753	.85566	.60483	1.65336	1.16868	1.93226	1.0268	50	
	20	.5469	.52002	.85416	.60881	1.64253	1.17075	1.92308	1.0239	40	
	30	.5498	.52249	.85264	.61280	1.63185	1.17283	1.91388	1.0210	30	
	40	.5527	.52497	.85112	.61681	1.62126	1.17493	1.90485	1.0181	20	
	50	.5556	.52745	.84959	.62083	1.61074	1.17704	1.89591	1.0152	10	
32	0	.5585	.52992	.84805	.62487	1.60033	1.17918	1.88708	1.0123	0	58
	10	.5614	.53239	.84650	.62892	1.59002	1.18133	1.87834	1.0094	50	
	20	.5643	.53484	.84495	.63298	1.57981	1.18350	1.86970	1.0065	40	
	30	.5672	.53730	.84339	.63703	1.56968	1.18569	1.86116	1.0036	30	
	40	.5701	.53975	.84183	.64117	1.55965	1.18790	1.85271	1.0007	20	
	50	.5730	.54219	.84025	.64528	1.54972	1.19012	1.84435	1.0077	10	57
ANGLE °	1	ARC.	COSINE	SINE	COTANG.	TANG.	COSEC.	SECANT	ARC.	1	0







FOR FUNCTIONS FROM

33° to 41° TRADE DOWNWARD AND FOR 45° to 57° FROM BOTTOM UP.

ANGLE 0 1	ARC.	SINE.	COSINE	TANG.	COTANG.	SECANT	COSEC.	ARC.	ANGLE 1 0		
33	0	.5760	.54464	.83867	.64941	1.58984	1.19436	1.83648	.5948	0	57
	10	.5787	.54708	.83708	.65353	1.58810	1.19465	1.83789	.5918	50	
	20	.5818	.54951	.83549	.65771	1.58643	1.19491	1.83981	.5890	40	
	30	.5847	.55194	.83388	.66188	1.58484	1.19520	1.84180	.5861	30	
	40	.5876	.55436	.83228	.66608	1.58333	1.19552	1.84384	.5832	20	
	50	.5905	.55678	.83068	.67029	1.58181	1.19586	1.84594	.5803	10	
34	0	.5934	.55919	.82904	.67451	1.48256	1.20622	1.78829	.5774	0	58
	10	.5963	.56160	.82741	.67875	1.47329	1.20859	1.78962	.5748	50	
	20	.5992	.56401	.82577	.68301	1.46411	1.21099	1.79103	.5721	40	
	30	.6021	.56641	.82413	.68728	1.45501	1.21341	1.79252	.5697	30	
	40	.6050	.56880	.82248	.69157	1.44598	1.21584	1.79408	.5672	20	
	50	.6080	.57119	.82082	.69588	1.43703	1.21830	1.79575	.5648	10	
35	0	.6109	.57358	.81916	.70021	1.42813	1.22077	1.79743	.5624	0	59
	10	.6138	.57596	.81748	.70455	1.41934	1.22327	1.79924	.5599	50	
	20	.6167	.57833	.81580	.70891	1.41061	1.22579	1.80111	.5574	40	
	30	.6196	.58070	.81412	.71329	1.40196	1.22833	1.80306	.5549	30	
	40	.6225	.58307	.81242	.71769	1.39334	1.23089	1.80506	.5524	20	
	50	.6254	.58543	.81072	.72211	1.38484	1.23347	1.80715	.5499	10	
36	0	.6283	.58778	.80902	.72654	1.37638	1.23607	1.80930	.5475	0	54
	10	.6312	.59014	.80730	.73099	1.36799	1.23869	1.81152	.5450	50	
	20	.6341	.59248	.80558	.73547	1.35967	1.24134	1.81382	.5427	40	
	30	.6370	.59482	.80386	.73996	1.35142	1.24400	1.81617	.5403	30	
	40	.6399	.59716	.80212	.74447	1.34323	1.24669	1.81859	.5379	20	
	50	.6428	.59949	.80038	.74900	1.33511	1.24940	1.82108	.5355	10	
37	0	.6458	.60182	.79864	.75355	1.32704	1.25214	1.82364	.5330	0	53
	10	.6487	.60414	.79688	.75813	1.31904	1.25489	1.82626	.5306	50	
	20	.6516	.60645	.79512	.76272	1.31108	1.25767	1.82894	.5282	40	
	30	.6545	.60876	.79335	.76733	1.30323	1.26047	1.83168	.5258	30	
	40	.6574	.61107	.79158	.77196	1.29541	1.26330	1.83448	.5234	20	
	50	.6603	.61337	.78979	.77661	1.28764	1.26615	1.83735	.5210	10	
38	0	.6632	.61566	.78801	.78129	1.27994	1.26902	1.84027	.5186	0	52
	10	.6661	.61795	.78622	.78598	1.27229	1.27191	1.84325	.5162	50	
	20	.6690	.62024	.78442	.79069	1.26471	1.27483	1.84629	.5138	40	
	30	.6719	.62252	.78261	.79544	1.25717	1.27778	1.84938	.5114	30	
	40	.6748	.62479	.78079	.80019	1.24967	1.28076	1.85254	.5090	20	
	50	.6777	.62706	.77897	.80498	1.24227	1.28376	1.85574	.5066	10	
39	0	.6807	.62935	.77715	.80973	1.23489	1.28674	1.85890	.5041	0	51
	10	.6836	.63163	.77531	.81441	1.22763	1.28978	1.86213	.5017	50	
	20	.6865	.63383	.77347	.81906	1.22031	1.29287	1.86543	.4993	40	
	30	.6894	.63601	.77163	.82374	1.21309	1.29597	1.86879	.4969	30	
	40	.6923	.63818	.76977	.82843	1.20593	1.29909	1.87219	.4945	20	
	50	.6952	.64033	.76791	.83316	1.19882	1.30223	1.87564	.4921	10	
40	0	.6981	.64250	.76604	.83790	1.19175	1.30541	1.87914	.4897	0	50
	10	.7010	.64461	.76417	.84267	1.18474	1.30861	1.88269	.4873	50	
	20	.7039	.64673	.76229	.84746	1.17776	1.31183	1.88630	.4849	40	
	30	.7068	.64884	.76041	.85228	1.17085	1.31509	1.88994	.4825	30	
	40	.7097	.65094	.75851	.85712	1.16397	1.31837	1.89362	.4801	20	
	50	.7127	.65306	.75662	.86199	1.15715	1.32168	1.89734	.4777	10	
41	0	.7156	.65506	.75471	.86689	1.15037	1.32501	1.90110	.4752	0	49
	10	.7186	.65725	.75279	.87181	1.14363	1.32838	1.90491	.4728	50	
	20	.7215	.65944	.75088	.87676	1.13694	1.33177	1.90876	.4704	40	
	30	.7245	.66162	.74896	.88173	1.13029	1.33519	1.91265	.4680	30	
	40	.7275	.66380	.74703	.88672	1.12369	1.33864	1.91658	.4656	20	
	50	.7305	.66597	.74509	.89173	1.11713	1.34212	1.92054	.4632	10	
42	0	.7335	.66813	.74314	.89676	1.11061	1.34563	1.92464	.4608	0	48
	10	.7365	.67028	.74118	.90181	1.10413	1.34917	1.92877	.4584	50	
	20	.7395	.67242	.73921	.90688	1.09769	1.35274	1.93294	.4560	40	
	30	.7425	.67456	.73724	.91196	1.09129	1.35634	1.93714	.4536	30	
	40	.7455	.67669	.73526	.91706	1.08492	1.35997	1.94137	.4512	20	
	50	.7485	.67881	.73328	.92217	1.07859	1.36363	1.94564	.4488	10	



FOR FUNCTIONS FROM

42° TO 45° READY DOWNWARD AND FOR 45° TO 48° FROM BOTTOM UPWARD

ANGLE 0	1	ARC	SINE	COSINE	TANG.	COTANG.	SECANT	COSEC.	ARC.	ANGLE 1
42	0	.7330	.66913	.74315	.98040	1.01061	1.34563	1.49447	.8279	0 48
10		.7359	.67129	.74119	.98562	1.10414	1.34417	1.48967	.8348	50
20		.7389	.67344	.73924	.99099	1.09770	1.35274	1.48491	.8419	40
30		.7418	.67559	.73728	.99633	1.09131	1.35634	1.48018	.8491	30
40		.7447	.67773	.73531	.99169	1.08495	1.35997	1.47551	.8561	20
50		.7476	.67987	.73334	.98709	1.07864	1.36363	1.47087	.8632	10
43	0	.7505	.68199	.73135	.98252	1.07237	1.36733	1.46622	.8703	0 47
10		.7534	.68412	.72937	.97797	1.06613	1.37105	1.46173	.8774	50
20		.7563	.68624	.72737	.97365	1.05994	1.37481	1.45721	.8845	40
30		.7592	.68835	.72537	.96936	1.05378	1.37860	1.45274	.8916	30
40		.7621	.69046	.72337	.96501	1.04766	1.38242	1.44831	.8987	20
50		.7650	.69256	.72136	.96068	1.04157	1.38628	1.44391	.9058	10
44	0	.7679	.69466	.71934	.95639	1.03553	1.39016	1.43955	.9129	0 46
10		.7708	.69675	.71732	.95207	1.02952	1.39409	1.43524	.9199	50
20		.7738	.69883	.71529	.94779	1.02355	1.39804	1.43096	.9270	40
30		.7767	.70091	.71325	.94353	1.01761	1.40203	1.42672	.9341	30
40		.7795	.70298	.71121	.93928	1.01171	1.40606	1.42251	.9412	20
50		.7824	.70505	.70916	.93501	1.00583	1.41012	1.41834	.9483	10
45	0	.7854	.70711	.70711	1.00000	1.00000	1.41421	1.41421	.7854	0 45
ANGLE		ARC.	COSINE	SINE	COTANG.	TANG.	COSEC.	SECANT	ARC.	ANGLE

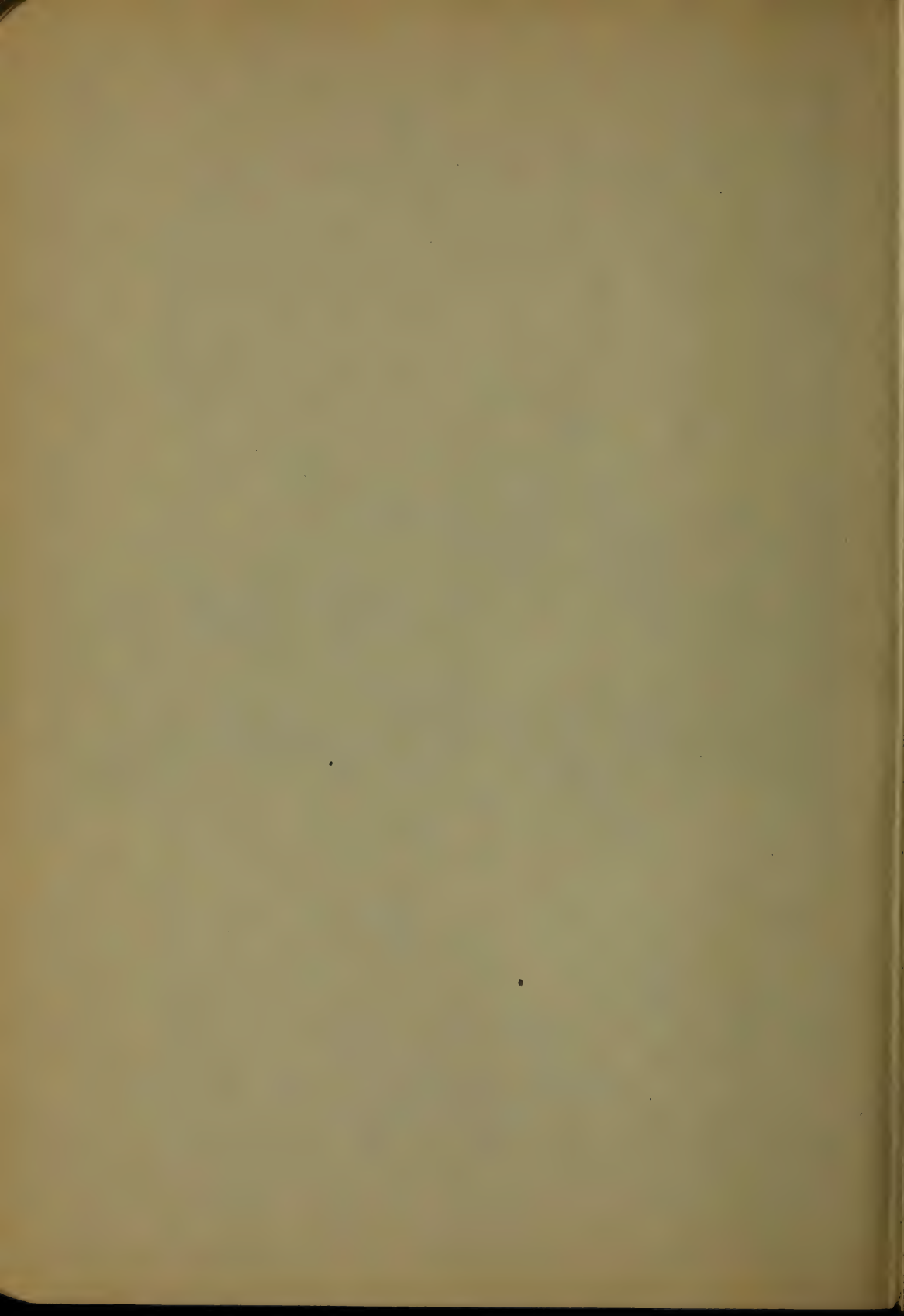
**CORRESPONDING ARCS**  
TO MINUTES AND SECONDS OF ANGLES BETWEEN  
0° TO 1° RESP. BETWEEN 0' AND 1 MINUTE FOR THE UNIT OF RADIUS.

## MINUTES

## SECONDS

M.	ARCS.	M.	ARCS.	M.	ARCS.	S.	ARCS.	S.	ARCS.	S.	ARCS.
1	.00029	21	.00611	41	.01193	1	.000005	21	.000102	41	.000199
2	.00058	22	.00640	42	.01222	2	.000010	22	.000107	42	.000204
3	.00087	23	.00669	43	.01251	3	.000015	23	.000112	43	.000208
4	.00116	24	.00698	44	.01280	4	.000019	24	.000116	44	.000213
5	.00145	25	.00727	45	.01309	5	.000024	25	.000121	45	.000218
6	.00175	26	.00756	46	.01338	6	.000029	26	.000126	46	.000223
7	.00204	27	.00785	47	.01367	7	.000034	27	.000131	47	.000228
8	.00233	28	.00814	48	.01396	8	.000039	28	.000136	48	.000233
9	.00262	29	.00844	49	.01425	9	.000044	29	.000141	49	.000238
10	.00291	30	.00873	50	.01454	10	.000049	30	.000146	50	.000243
11	.00320	31	.00902	51	.01484	11	.000053	31	.000150	51	.000247
12	.00349	32	.00931	52	.01513	12	.000058	32	.000155	52	.000252
13	.00378	33	.00960	53	.01542	13	.000063	33	.000160	53	.000257
14	.00407	34	.00989	54	.01572	14	.000068	34	.000165	54	.000262
15	.00436	35	.01018	55	.01600	15	.000073	35	.000170	55	.000267
16	.00465	36	.01047	56	.01629	16	.000078	36	.000175	56	.000271
17	.00495	37	.01076	57	.01658	17	.000082	37	.000179	57	.000276
18	.00524	38	.01105	58	.01687	18	.000087	38	.000184	58	.000281
19	.00553	39	.01134	59	.01716	19	.000092	39	.000189	59	.000286
20	.00582	40	.01164	60	.01745	20	.000097	40	.000194	60	.000291







# LENGTH OF ARCS, LENGTH OF CHORDS, HEIGHT OF ARCS AND THE CORRESPONDING AREAS OF SEGMENTS AND SECTORS TO THE UNIT OF RADIUS AND FOR ANGLES FROM 1° TO 180°.



$$\text{ANGLE } \alpha^\circ \text{ DEGREE} = \frac{180 L}{\pi R} = 57.2957 \frac{L}{R}, \text{ SECTOR.}$$

$$\text{LENGTH OF ARC} = L = \frac{\pi R \alpha}{180} = .017453 R \alpha,$$

$$\text{LENGTH OF CHORD} = C = 2R \sin \frac{\alpha}{2} = 2 \sqrt{1 - \cos \alpha},$$

$$\text{HEIGHT OF ARC} = H = 2R \sin^2 \frac{\alpha}{4},$$

$$\text{AREA OF SEGMENT} = A = \frac{R^2}{2} \left( \frac{\pi}{180} \alpha - \sin \alpha \right),$$

$$\text{AREA OF SECTOR} = A' = \frac{\alpha}{360} \pi R^2 = .0087266 R^2 \alpha,$$



ANGLE IN °	L	C	H	A	A'	ANGLE IN °	L	C	H	A	A'
1	.0175	.0175	.00004	.00000	.008726	41	.7156	.7004	.06333	.02974	.35778
2	.0349	.0349	.00015	.00000	.017453	42	.7330	.7167	.06642	.03195	.36659
3	.0524	.0524	.00034	.00001	.026179	43	.7505	.7330	.06958	.03425	.37524
4	.0698	.0698	.00061	.00003	.034907	44	.7679	.7492	.07281	.03664	.38373
5	.0873	.0872	.00095	.00006	.043633	45	.7854	.7654	.07612	.03915	.39207
6	.1047	.1046	.00137	.00010	.052359	46	.8029	.7815	.07955	.04176	.40026
7	.1222	.1221	.00187	.00035	.061087	47	.8203	.7975	.08309	.04448	.40831
8	.1396	.1395	.00244	.00023	.069813	48	.8378	.8135	.08665	.04731	.41623
9	.1571	.1569	.00308	.00035	.078539	49	.8552	.8294	.09020	.05025	.42404
10	.1745	.1743	.00381	.00044	.087267	50	.8727	.8452	.09387	.05331	.43173
11	.1920	.1917	.00460	.00059	.095993	51	.8901	.8610	.09764	.05647	.43930
12	.2094	.2091	.00548	.00076	.104719	52	.9076	.8767	.1012	.05973	.44675
13	.2269	.2264	.00643	.00097	.113446	53	.9250	.8924	.1051	.06319	.45408
14	.2443	.2437	.00745	.00121	.122173	54	.9425	.9080	.1090	.06673	.46129
15	.2618	.2611	.00851	.00149	.130899	55	.9599	.9235	.1130	.07037	.46837
16	.2793	.2783	.00973	.00181	.139626	56	.9774	.9389	.1171	.07417	.47532
17	.2967	.2956	.01098	.00217	.148353	57	.9948	.9543	.1212	.07808	.48214
18	.3142	.3129	.01231	.00257	.157079	58	1.0123	.9696	.1254	.08212	.48884
19	.3316	.3301	.01371	.00302	.165806	59	1.0297	.9848	.1296	.08629	.49542
20	.3491	.3473	.01519	.00352	.174533	60	1.0472	1.0000	.1340	.09059	.50187
21	.3665	.3645	.01675	.00408	.183260	61	1.0647	1.0157	.1384	.09502	.50820
22	.3840	.3816	.01837	.00468	.191986	62	1.0821	1.0301	.1428	.09958	.51441
23	.4014	.3987	.02008	.00536	.200712	63	1.0996	1.0450	.1474	.10428	.52050
24	.4189	.4158	.02185	.00607	.209439	64	1.1170	1.0598	.1520	.10911	.52648
25	.4363	.4329	.02370	.00686	.218166	65	1.1345	1.0746	.1566	.11408	.53235
26	.4538	.4499	.02563	.00771	.226893	66	1.1519	1.0893	.1613	.11919	.53811
27	.4712	.4669	.02763	.00862	.235619	67	1.1694	1.1039	.1661	.12443	.54376
28	.4887	.4838	.02969	.00961	.244346	68	1.1868	1.1184	.1710	.12982	.54930
29	.5061	.5008	.03185	.01067	.253073	69	1.2043	1.1328	.1759	.13535	.55473
30	.5236	.5176	.03407	.01180	.261799	70	1.2217	1.1472	.1808	.14102	.56006
31	.5411	.5345	.03637	.01301	.270526	71	1.2392	1.1614	.1859	.14683	.56529
32	.5585	.5512	.03874	.01429	.279253	72	1.2566	1.1756	.1910	.15279	.57043
33	.5760	.5680	.04113	.01565	.287979	73	1.2741	1.1896	.1961	.15889	.57548
34	.5934	.5847	.04370	.01711	.296706	74	1.2915	1.2036	.2014	.16514	.58043
35	.6109	.6016	.04628	.01864	.305433	75	1.3090	1.2175	.2066	.17154	.58529
36	.6283	.6180	.04894	.02027	.314160	76	1.3265	1.2313	.2120	.17808	.59006
37	.6458	.6346	.05168	.02198	.322887	77	1.3439	1.2450	.2174	.18477	.59473
38	.6632	.6511	.05446	.02375	.331614	78	1.3614	1.2586	.2229	.19160	.59930
39	.6807	.6676	.05736	.02558	.340341	79	1.3788	1.2722	.2284	.19859	.60378
40	.6981	.6840	.06031	.02747	.349068	80	1.3963	1.2858	.2340	.20573	.60817



ANGLE °	L	C	H	A	A'	ANGLE °	L	C	H	A	A'
81	1.4137	1.3929	2.594	2.1301	706858	131	2.2864	1.8149	8853	76584	1.14319
82	1.4312	1.3121	2.433	2.2045	715336	132	2.3038	1.8271	8933	78034	1.15192
83	1.4486	1.3252	2.510	2.2804	724312	133	2.3213	1.8341	9013	79497	1.16064
84	1.4661	1.3383	2.589	2.3574	733308	134	2.3387	1.8410	9093	80970	1.16937
85	1.4835	1.3512	2.667	2.4367	741765	135	2.3562	1.8478	9173	82454	1.17809
86	1.5010	1.3640	2.745	2.5177	750492	136	2.3736	1.8544	9254	83949	1.18682
87	1.5184	1.3767	2.824	2.5990	759219	137	2.3911	1.8608	9335	85458	1.19555
88	1.5359	1.3893	2.907	2.6825	767945	138	2.4086	1.8672	9416	86971	1.20427
89	1.5533	1.4018	2.987	2.7675	776672	139	2.4260	1.8733	9498	88497	1.21298
90	1.5708	1.4143	3.069	2.8540	785398	140	2.4434	1.8794	9580	90034	1.22173
91	1.5882	1.4265	3.151	2.9420	794152	141	2.4609	1.8853	9662	91580	1.23046
92	1.6057	1.4387	3.233	3.0316	802885	142	2.4784	1.8910	9744	93135	1.23918
93	1.6232	1.4507	3.316	3.1226	811578	143	2.4958	1.8966	9827	94700	1.24791
94	1.6406	1.4627	3.398	3.2152	820305	144	2.5133	1.9021	9910	96274	1.25664
95	1.6581	1.4746	3.484	3.3093	829032	145	2.5307	1.9074	9993	97858	1.26536
96	1.6755	1.4863	3.569	3.4050	837758	146	2.5482	1.9126	10076	99449	1.27409
97	1.6930	1.4979	3.654	3.5021	846485	147	2.5656	1.9176	10160	101050	1.28282
98	1.7104	1.5094	3.739	3.6008	855212	148	2.5831	1.9225	10244	102658	1.29154
99	1.7279	1.5208	3.824	3.7009	863938	149	2.6005	1.9273	10328	104278	1.30027
100	1.7453	1.5321	3.909	3.8026	872665	150	2.6180	1.9319	10412	105900	1.30899
101	1.7628	1.5432	3.994	3.9052	881392	151	2.6354	1.9363	10496	107532	1.31772
102	1.7802	1.5543	4.079	4.0104	890118	152	2.6529	1.9406	10581	109171	1.32645
103	1.7977	1.5652	4.164	4.1166	898845	153	2.6703	1.9447	10665	110818	1.33517
104	1.8151	1.5760	4.249	4.2242	907572	154	2.6878	1.9487	10750	112472	1.34390
105	1.8326	1.5867	4.334	4.3334	916300	155	2.7052	1.9526	10835	114132	1.35262
106	1.8500	1.5973	4.419	4.4439	925025	156	2.7227	1.9563	10920	115799	1.36136
107	1.8675	1.6077	4.504	4.5550	933752	157	2.7402	1.9598	11006	117472	1.37008
108	1.8850	1.6180	4.589	4.6665	942478	158	2.7576	1.9633	11092	119151	1.37881
109	1.9024	1.6282	4.674	4.7784	951205	159	2.7751	1.9665	11178	120835	1.38753
110	1.9199	1.6383	4.759	4.8908	959931	160	2.7925	1.9696	11264	122525	1.39626
111	1.9373	1.6483	4.844	5.0037	968658	161	2.8100	1.9726	11350	124221	1.40498
112	1.9548	1.6581	4.929	5.1179	977385	162	2.8274	1.9754	11436	125921	1.41372
113	1.9722	1.6678	5.014	5.2336	986112	163	2.8449	1.9780	11522	127626	1.42244
114	1.9897	1.6773	5.099	5.3507	994838	164	2.8623	1.9805	11608	129335	1.43117
115	2.0071	1.6868	5.184	5.4681	1.003565	165	2.8798	1.9829	11694	131049	1.43989
116	2.0246	1.6961	5.269	5.5859	1.012292	166	2.8972	1.9851	11781	132766	1.44862
117	2.0420	1.7053	5.354	5.7042	1.021019	167	2.9147	1.9871	11867	134487	1.45735
118	2.0595	1.7143	5.439	5.8227	1.029746	168	2.9322	1.9890	11954	136212	1.46608
119	2.0769	1.7233	5.524	5.9416	1.038473	169	2.9496	1.9908	12041	137940	1.47481
120	2.0944	1.7321	5.609	6.0611	1.047198	170	2.9671	1.9924	12128	139671	1.48353
121	2.1118	1.7407	5.694	6.1824	1.055925	171	2.9845	1.9948	12215	141404	1.49226
122	2.1293	1.7492	5.779	6.3043	1.064652	172	3.0020	1.9951	12302	143140	1.50098
123	2.1468	1.7576	5.864	6.4266	1.073379	173	3.0194	1.9963	12390	144878	1.50971
124	2.1642	1.7659	5.949	6.5495	1.082105	174	3.0369	1.9973	12478	146617	1.51844
125	2.1817	1.7740	6.034	6.6725	1.090832	175	3.0543	1.9981	12566	148359	1.52716
126	2.1991	1.7820	6.119	6.7958	1.099558	176	3.0718	1.9988	12654	150101	1.53589
127	2.2166	1.7899	6.204	6.9197	1.108285	177	3.0892	1.9993	12742	151846	1.54462
128	2.2340	1.7978	6.289	7.0431	1.117012	178	3.1067	1.9997	12830	153589	1.55334
129	2.2515	1.8062	6.374	7.1671	1.125738	179	3.1241	1.9999	12918	155334	1.56207
130	2.2689	1.8146	6.459	7.2914	1.134465	180	3.1416	2.0000	13006	157080	1.57079

For L=R THE CORRESPONDING ANGLE =  $57^{\circ} 7' 44.106'' = 57.2957795^{\circ}$

OR IN SECONDS =  $206264.206''$

$$\text{ARC } l'' = \frac{\pi}{180} = \frac{3.14159}{180} = .017453293; \text{ ARC } l' = \frac{3.14159}{60 \times 180} = .000290888;$$

$$\text{ARC } l'' = \frac{3.14159}{60 \times 60 \times 180} = \frac{3.14159}{648000} = .0000048481;$$







# CONVERTING DEGREES, MINUTES AND SECONDS OF THE 60. DIVISION INTO DEGREES, MINUTES AND SECONDS OF THE 100. DIVISION OF AN ARC.

100. DIVISION	60. DIVISION.				100. DIVISION	60. DIVISION.			
	DEG.	MINUTE	MINUT. SEC.	SECONDS.		DEG.	MINUTE	MINUT. SEC.	SECONDS.
1	0	54	0	32.4	51	45	54	27	32.4
2	0	48	1	4.8	52	46	48	28	4.8
3	0	42	2	37.2	53	47	42	29	37.2
4	0	36	3	9.6	54	48	36	30	9.6
5	0	30	4	42.0	55	49	30	31	42.0
6	0	24	5	14.4	56	50	24	32	14.4
7	0	18	6	46.8	57	51	18	33	46.8
8	0	12	7	19.2	58	52	12	34	19.2
9	0	6	8	51.6	59	53	6	35	51.6
10	0	0	9	24.0	60	54	0	36	24.0
11	9	54	5	56.4	61	54	54	37	56.4
12	10	48	6	28.8	62	55	48	38	28.8
13	11	42	7	1.2	63	56	42	39	1.2
14	12	36	8	33.6	64	57	36	40	33.6
15	13	30	9	6.0	65	58	30	41	6.0
16	14	24	10	38.4	66	59	24	42	38.4
17	15	18	11	10.8	67	60	18	43	10.8
18	16	12	12	43.2	68	61	12	44	43.2
19	17	6	13	15.6	69	62	6	45	15.6
20	18	0	14	48.0	70	63	0	46	48.0
21	18	54	15	6.04	71	63	54	47	6.04
22	19	48	16	58.8	72	64	48	48	58.8
23	20	42	17	25.2	73	65	42	49	25.2
24	21	36	18	57.6	74	66	36	50	57.6
25	22	30	19	30.0	75	67	30	51	30.0
26	23	24	20	2.4	76	68	24	52	2.4
27	24	18	21	34.8	77	69	18	53	34.8
28	25	12	22	7.2	78	70	12	54	7.2
29	26	6	23	39.6	79	71	6	55	39.6
30	27	0	24	12.0	80	72	0	56	12.0
31	27	54	25	44.4	81	72	54	57	44.4
32	28	48	26	16.8	82	73	48	58	16.8
33	29	42	27	49.2	83	74	42	59	49.2
34	30	36	28	21.6	84	75	36	60	21.6
35	31	30	29	54.0	85	76	30	61	54.0
36	32	24	30	26.4	86	77	24	62	26.4
37	33	18	31	58.8	87	78	18	63	58.8
38	34	12	32	31.2	88	79	12	64	31.2
39	35	6	33	3.6	89	80	6	65	3.6
40	36	0	34	36.0	90	81	0	66	36.0
41	36	54	35	8.4	91	81	54	67	8.4
42	37	48	36	40.8	92	82	48	68	40.8
43	38	42	37	13.2	93	83	42	69	13.2
44	39	36	38	45.6	94	84	36	70	45.6
45	40	30	39	18.0	95	85	30	71	18.0
46	41	24	40	50.4	96	86	24	72	50.4
47	42	18	41	22.8	97	87	18	73	22.8
48	43	12	42	55.2	98	88	12	74	55.2
49	44	6	43	27.6	99	89	6	75	27.6
50	45	0	44	0.0	100	90	0	76	0.0

FROM TABLE:  $41^{\circ} 64' 80'' = 36^{\circ} 54' 34.56''$   
 $= 36^{\circ} 54' 35.92'' = 37^{\circ} 28' 59.52''$

# VALUES OF SPECIAL NUMBERS.

$\pi$  = THE RATIO OF THE CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER = 3.1415926....

$g$  = THE ACCELERATION BY GRAVITY OF FALLING SOLIDS AT THE END OF ANY TIME = 32.2 FEET OR = 9.81 METERS.

NUMBER	VALUE	NUMBER	VALUE	NUMBER	VALUE
$\pi$	3.1415926	$\frac{\pi}{16}$	.196350	$\sqrt{\pi}$	1.772454
$\text{LOG } \pi$	.4971499	$\frac{\pi}{32}$	.098175	$\sqrt[3]{\pi}$	1.464592
$\frac{\pi}{2}$	1.5707963	$\frac{\pi}{64}$	.049087	$\frac{1}{\sqrt{\pi}}$	.5641896
$\text{LOG } \frac{\pi}{2}$	.1961199	$\frac{\pi}{90}$	.034907	$\frac{1}{\sqrt[3]{\pi}}$	.6827841
$\frac{\pi}{3}$	1.0471976	$\frac{\pi}{180}$	.017453	$g$	32.2 FEET
$\text{LOG } \frac{\pi}{3}$	.0200286	$\frac{1}{\pi}$	.3183099	$2g$	64.4 "
$\frac{\pi}{4}$	.7853982	$\text{LOG } \frac{1}{\pi}$	.5028501-1	$\frac{1}{g}$	.031 "
$\text{LOG } \frac{\pi}{4}$	.8950899-1	$\frac{16}{\pi}$	5.0929583	$g^2$	1036.84 "
$\frac{\pi}{5}$	.6283185	$\text{LOG } \frac{16}{\pi}$	.7069701	$g^3$	33386.24 "
$\text{LOG } \frac{\pi}{5}$	.7981799-1	$\frac{64}{\pi}$	20.371833	$\sqrt{g}$	5.674 "
$\frac{\pi}{6}$	.5235988	$\frac{180}{\pi}$	57.295780	$\frac{1}{\sqrt{g}}$	.176 "
$\text{LOG } \frac{\pi}{6}$	.7189986-1	$\pi^2$	9.8696044	$\sqrt[3]{g}$	3.181 "
$\frac{\pi}{7}$	.448799	$4\pi^2$	39.478418	$\frac{1}{\sqrt[3]{g}}$	.314 "
$\text{LOG } \frac{\pi}{7}$	.6520519-1	$\frac{\pi^2}{4}$	2.467401	$\text{LOG } g$	1.507856 "
$\frac{\pi}{8}$	.3926991	$\frac{1}{\pi^2}$	.1013212	$g^2$	96.236 METER
$\text{LOG } \frac{\pi}{8}$	.5940599-1	$\pi^3$	31.0062767	$g^3$	944.07614 "
$\frac{\pi}{9}$	.3490659	$\frac{1}{\pi^3}$	.0322515	$\text{SIN } 30^\circ$	$\text{COS } 60^\circ = \frac{1}{2}$
$\text{LOG } \frac{\pi}{9}$	.5429074-1	$\pi^4$	97.4061	$\text{SIN } 75^\circ$	$\text{COS } 15^\circ = .9659$
$\frac{\pi}{12}$	.2617911	$\frac{1}{\pi^4}$	.0102660	$\text{COS } 75^\circ$	$\text{SIN } 15^\circ = .2598$
		$\pi^5$	306.0197	$\text{COS } 30^\circ$	$\text{SIN } 60^\circ = \frac{1}{2}\sqrt{3} = .866$
		$\frac{1}{\pi^5}$	.0032678	$\text{TAN } 30^\circ$	$\text{COT } 60^\circ = \frac{1}{3}\sqrt{3} = .5774$
		$\pi^6$	961.389	$\text{COT } 30^\circ$	$\text{TAN } 60^\circ = \sqrt{3} = 1.7321$
		$\frac{1}{\pi^6}$	.0010402		









# PROPERTIES OF PLANE FIGURES AND BODIES.

## I. PLANE FIGURES.

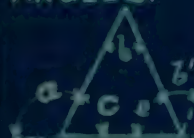
D=DIAMETER. P=PERIPHERY OR CIRCUMFERENCE.

R=RADIUS. A=AREA OF PLANE FIGURES.

$$\pi = 3.145926.$$

### TRIANGLES.

ANGLES:



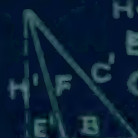
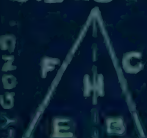
SIDES:

$$b + c + a = 180^\circ, b' = b,$$

$$a' = b' + c = b + c, e' = c,$$

$$b = a - c = 180^\circ - e' - c,$$

SIDES & HEIGHT:



$$H = \sqrt{F^2 - E^2}, H' = \sqrt{F'^2 - E'^2}$$

$$E = \frac{F^2 + B^2 - C^2}{2B}, E' = \frac{C'^2 - F'^2 - B'^2}{2B}$$

$$C = \sqrt{F^2 + B^2 - 2BE}, C' = \sqrt{F'^2 + B'^2 - 2B'E'}$$

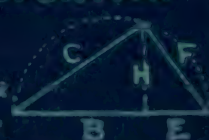
AREA:



$$A = \frac{BH}{2}$$

$$A = \frac{B}{2} \sqrt{F^2 - \left( \frac{F^2 + B^2 - C^2}{2B} \right)^2}$$

PROPORTION:



$$C:B = F:H,$$

$$F:B + E = E:F = H:C$$

$$H = \frac{FB}{C} = \frac{CE}{F}$$

SQUARE.

RECTANGLE.

TRAPEZIUM.

TRAPEZOID.



$$A = B^2$$



$$A = BH$$



$$A = \frac{1}{2} [B(H + H') + EH + E'H']$$



$$A = \frac{1}{2} H(B + G)$$

CIRCLE.



$$P = \pi D = 3.1416 D = 2\pi R = 6.283 R = 3.545 \sqrt{A}$$

$$D = \frac{P}{\pi} = 1.128 \sqrt{A}, R = \sqrt{\frac{A}{\pi}} = .5642 \sqrt{A}$$

$$A = \frac{\pi D^2}{4} = .7854 D^2 = \pi R^2 = \frac{P^2}{12.5664}$$

RING.



FOR AREAS, CIRCUMFERENCES SEE PAGE 17 & 20 & 49 & 62,  $A = .7854 (D^2 - D'^2)$

FOR ARCS, CORDS, SEGMENTS & SECTORS SEE PAGE 27 & 28 & 30 & 31 & 36

ELLIPSE.

PARABOLA.

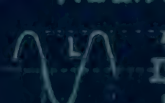
HELIX.

SPIRAL.



$$P = 1.795 D + 1.4 D', P = R \left( 1 + \frac{5}{3} \frac{H^2}{R^2} \right)$$

$$A = .7854 D D', A = \frac{2}{3} H R$$



P=PITCH

L=L'xLENGTH

OF ARC.

R & R'=RADIUS.

N=NUMBER OF TURNS

OF COILS.



$$L = N \sqrt{\pi^2 D^2 + P^2}, L = \pi N \left( \frac{D + D'}{2} \right) = \frac{\pi}{2} (R + R')$$

## 2. SURFACE AND VOLUME OF BODIES.

A = AREA OF PLANE FIGURE, C = PERIPHERICAL AREA,  $\pi = 3.1416$ .  
 S = SURFACE OF BODIES, V = VOLUME OF BODIES.

## CYLINDER.



$$C = 2\pi R.H;$$

$$H = \frac{C}{2\pi R};$$

$$S = \pi DH + \frac{1}{2}\pi D^2;$$

$$V = .785 D^2.H;$$



$$C = \pi R (H_1 + H_2);$$

$$V = \pi R^2 \frac{H_1 + H_2}{2};$$

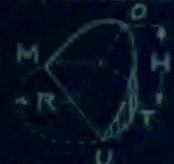
## HOLLOW CYLINDER



$$C = 2\pi H (R' + R);$$

$$V = \pi H (R'^2 - R^2);$$

## CYLINDER HOOF



$$C = MTU + MTUO =$$

$$= 2\pi R H;$$

$$V = \frac{2}{3} \pi R^2 H;$$

## SPHERE.



$$S = 4\pi R^2 = 12.566 R^2;$$

$$= \pi D^2;$$

$$V = \frac{4}{3} \pi R^3 = .5236 D^3.$$

## SPHERICAL SECTOR.



$$S = \frac{\pi R}{2} (4H + K);$$

$$V = \frac{2}{3} \pi R^2 H = 2.094 R^2 H;$$

## SPHERICAL SEGMENT.



$$S = 2\pi R H = \frac{\pi}{4} (K^2 + 4H^2);$$

$$V = \pi H^2 (R - \frac{1}{3}H) =$$

$$= \pi H (\frac{K^2}{8} + \frac{H^2}{6}).$$

## SPHERICAL ZONE.



$$S = 2\pi R H;$$

$$V = \frac{1}{6} \pi H (3X^2 + 3W^2 + H^2);$$

## CUBE OR PRISM.



$$S = 2W.B.(2H + 1);$$

$$V = H.W.B.$$

## CYLINDRICAL RING

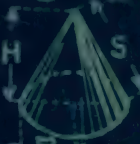


$$S = 39.478 R'R;$$

$$= 9.869 DD';$$

$$V = 2\pi^2 R R' = 2.47 DD'^2;$$

## PYRAMID &amp; CONE.



$$S = \pi R s =$$

$$= \pi R \sqrt{R^2 + H^2}$$

$$V = \frac{H}{2} \times A$$

## FRUSTUM OF PYRAMID



$$S = \frac{P+P'}{2} \times BQ + A+B$$

$$V = \frac{H}{3} (A+B+\sqrt{AB})$$

## OF CONE.



$$V = \frac{\pi H}{3} (R^2 + R'^2 + RR')$$

$$= \pi (\frac{D^2 + D'^2 + DD'}{12}) H;$$

$$C = \pi s (R + R')$$

## ELLIPSOID.



$$V = \frac{1}{6} \pi DD'D'';$$

## PARABOLOID.



$$V = \frac{\pi}{8} R^2 H;$$

## BARREL.



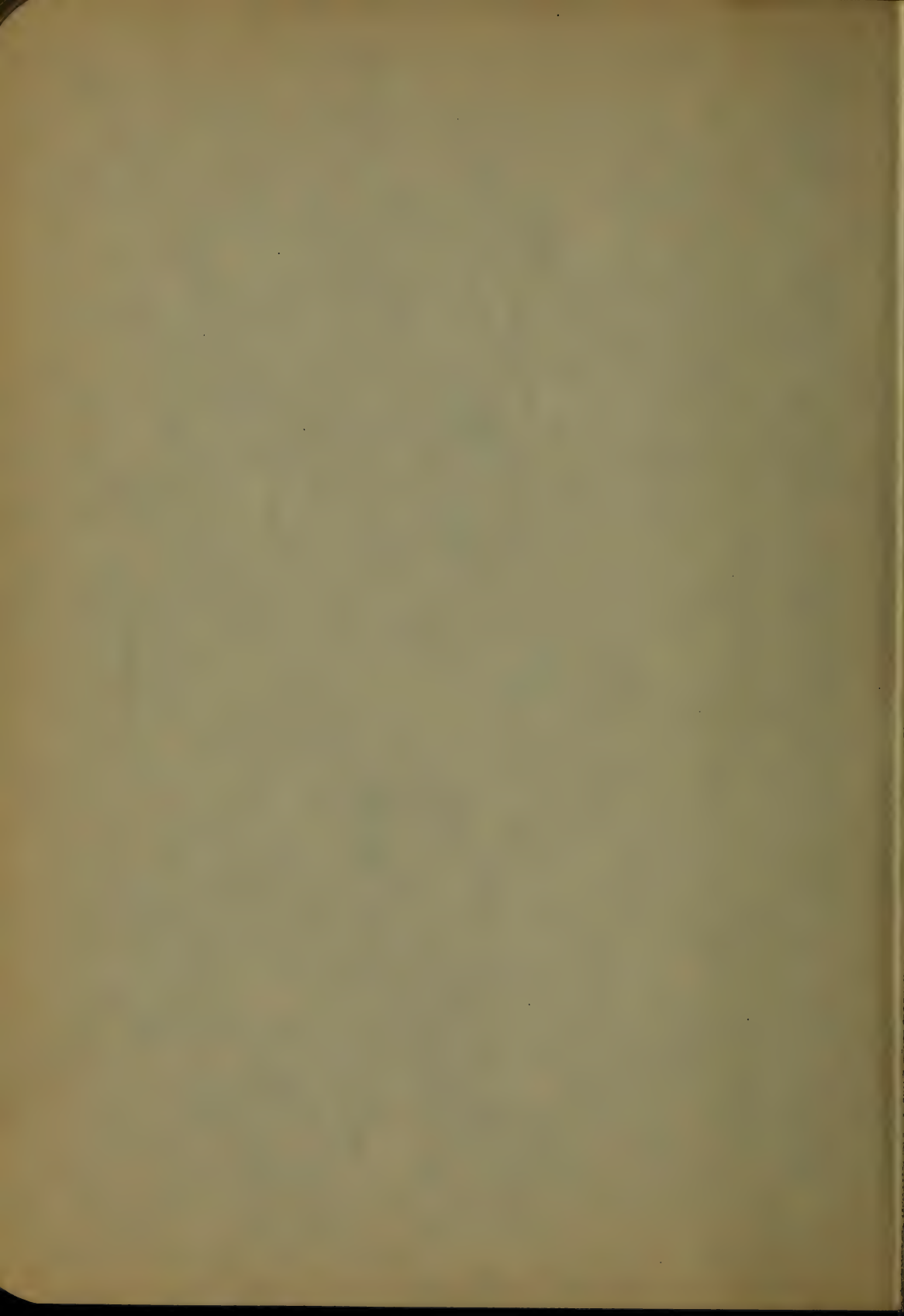
$$V = 1.045 H (.4 D^2 + .2 DD' + .15 D'^2);$$

## VOLUME OF MANUFACTURED BARREL

D	D'	H	V. GALL'S. C. FEET
16 $\frac{3}{4}$	12 $\frac{1}{2}$	19 $\frac{3}{4}$	
19 $\frac{3}{4}$	14 $\frac{3}{4}$	24 $\frac{1}{2}$	

BONGE HOLE 2" DIAMETER.







# PROPERTIES OF REGULAR POLYGONS.



$$S = 2R \sin\left(\frac{180}{P_n}\right) =$$

$$= 2P_n T \tan\left(\frac{180}{P_n}\right)$$

$$A = \frac{P_n}{2} R^2 \sin\left(\frac{360}{P_n}\right) =$$

$$= P_n T^2 \tan\left(\frac{180}{P_n}\right) =$$

$$= \frac{P_n S^2}{4} \cot\left(\frac{180}{P_n}\right)$$

P <sub>n</sub>	ANGLE α°	SIDES. S	INSIDE RADIUS T	OUTSIDE RADIUS R	AREA α x S <sup>2</sup> A	α x R <sup>2</sup> A
3	60°	1.7321 R	.5000 R	.5774 S	.4330 S <sup>2</sup>	1.2990 R <sup>2</sup>
4	90°	1.4142 R	.7071 R	.7071 S	1.0000 "	2.0000 "
5	108°	1.1756 R	.80902 R	.8507 S	1.7205 "	2.3776 "
6	120°	1.0000 R	.86603 R	1.000 S	2.5981 "	2.5981 "
7	128.57°	.8678 R	.90097 R	1.1524 S	3.6339 "	2.7364 "
8	135°	.7654 R	.92388 R	1.3066 S	4.8284 "	2.8284 "
9	144°	.6840 R	.93969 R	1.4619 S	6.1818 "	2.8928 "
10	144°	.6180 R	.95106 R	1.6180 S	7.6942 "	2.9384 "
11	148.26°	.5578 R	.95849 R	1.7748 S	9.3650 "	2.9853 "
12	150°	.5176 R	.96593 R	1.9319 S	11.1462 "	3.0000 "
15	156°	.4158 R	.97815 R	2.4049 S	17.6424 "	3.2505 "
16	157.5°	.3908 R	.98078 R	2.5629 S	20.1094 "	3.0615 "
20	162°	.3129 R	.98749 R	3.1463 S	31.5688 "	3.0902 "
24	165°	.2611 R	.99144 R	3.8505 S	45.5745 "	3.1058 "
32	168.75°	.1960 R	.99519 R	5.1013 S	61.2254 "	3.1215 "
48	175.5°	.1301 R	.99786 R	7.6576 S	105.0846 "	3.1326 "
64	174.22°	.0981 R	.99880 R	10.1899 S	325.6923 "	3.1366 "

$$\text{CIRCUMFERENCE OF POLYGONS} = C = P_n S = 2 P_n R \sin \frac{180}{P_n} =$$

$$= 2 P_n T \tan \frac{180}{P_n}$$

P<sub>n</sub> = NUMBER OF SIDES IN POLYGON, — C AND C' = COEFFICIENTS.

## CONSTRUCTION OF POLYGONS.



TRIANGLE.



SQUARE.



PENTAGON.



HEXAGON.



OCTAGON AND HEPTAGON, ANY OTHER POLYGON.



DECAGON.



DODECAGON.



## VOLUME OF SPHERES.

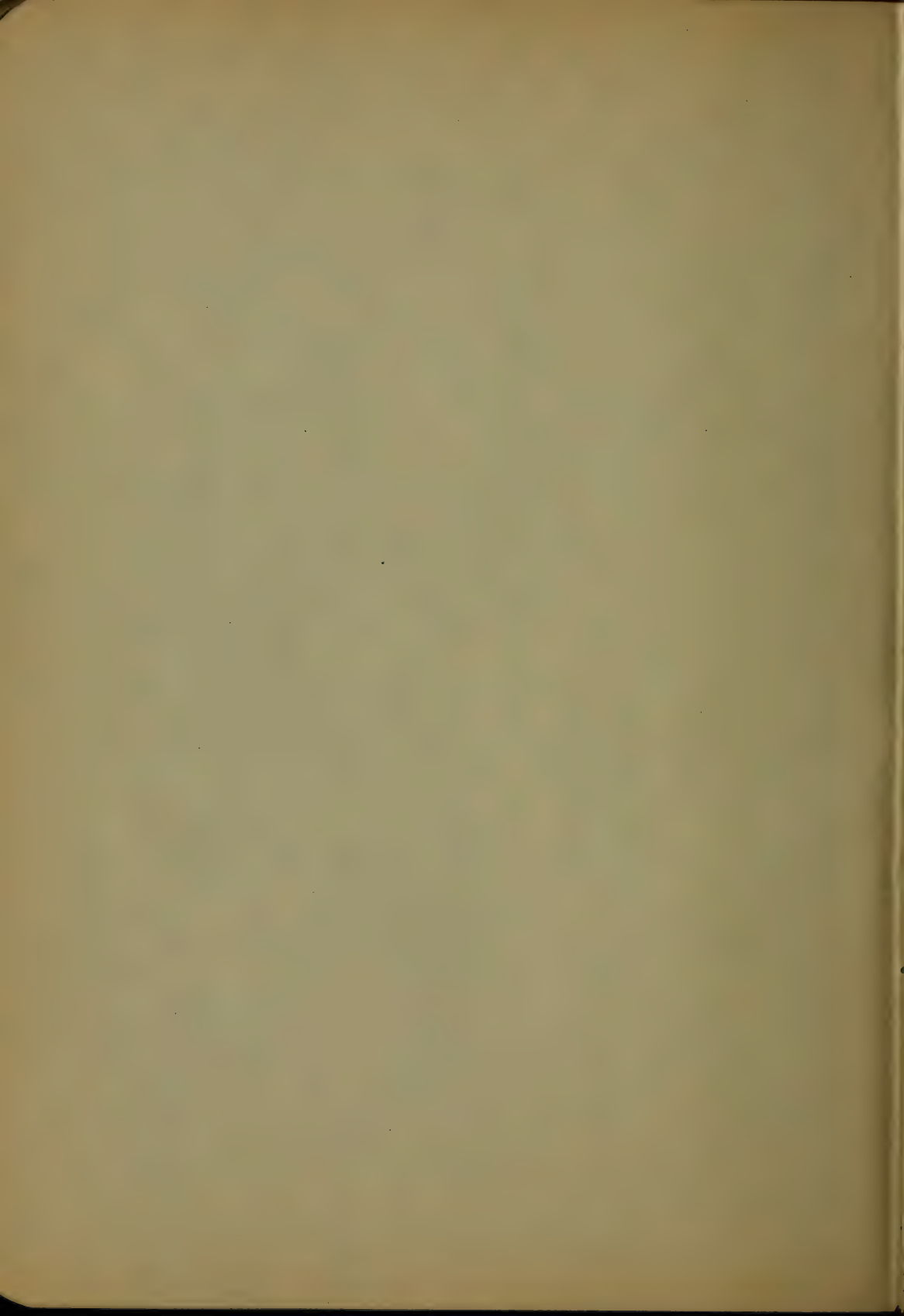
DIAMETER D FROM  $\frac{1}{16}$  TO 10"

D INCH.	VOLUME CUB. INCH.	D INCH.	VOLUME CUB. INCH.	D INCH.	VOLUME CUB. INCH.	D INCH.	VOLUME CUB. INCH.	D INCH.	VOLUME CUB. INCH.
.1	.00052	2.1	4.24405	4.1	36.0369	6.1	118.8469	8.1	278.2615
.2	.00419	.2	5.57328	.2	38.7924	.2	124.7882	.2	282.6956
.3	.01414	.3	6.37063	.3	41.6298	.3	130.9243	.3	299.387
.4	.03351	.4	7.23823	.4	44.6022	.4	137.2523	.4	310.3291
.5	.06510	.5	8.18123	.5	47.7129	.5	143.7933	.5	321.5551
.6	.11309	.6	9.20277	.6	50.9650	.6	150.5325	.6	333.0382
.7	.17959	.7	10.3060	.7	54.3616	.7	157.4791	.7	344.7914
.8	.26808	.8	11.49404	.8	57.9058	.8	164.6362	.8	356.8160
.9	.38170	.9	12.77005	.9	61.6009	.9	172.0067	.9	369.1210
1.0	.52359	3.0	14.13717	5.0	65.44984	7.0	179.5943	9.0	381.7035
.1	.69691	.1	15.5985	.1	69.4559	.1	187.4017	.1	394.5688
.2	.90478	.2	17.1573	.2	73.6222	.2	195.432	.2	407.720
.3	1.15035	.3	18.8165	.3	77.9518	.3	203.6888	.3	421.1604
.4	1.43675	.4	20.5795	.4	82.4480	.4	212.1748	.4	434.8928
.5	1.76715	.5	22.4493	.5	87.1137	.5	220.8933	.5	448.9204
.6	2.14466	.6	24.4290	.6	91.9523	.6	229.8473	.6	463.2467
.7	2.57244	.7	26.5218	.7	96.9668	.7	239.040	.7	477.8744
.8	3.05363	.8	28.7369	.8	102.1604	.8	248.475	.8	492.8070
.9	3.59136	.9	31.0894	.9	107.5362	.9	258.1546	.9	508.0473
2.0	4.18879	4.0	33.51032	6.0	113.0974	8.0	268.0824	10.0	523.5988

## WEIGHT OF CAST IRON AND LEAD BALLS.

CAST IRON WEIGHS .26 LB. PER C. IN. LEAD .408 LB. PER C. IN.







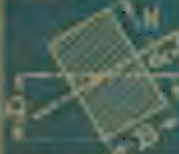

DIAMETER INCH.	CAST IRON. LBS.	LEAD. LBS.	DIAMETER INCH.	CAST IRON. LBS.	LEAD. LBS.
$\frac{1}{4}$	.0024	.0037	$5 \frac{1}{4}$	19.767	31.004
$\frac{1}{2}$	.017	.027	$\frac{1}{8}$	22.721	35.729
$\frac{3}{4}$	.052	.083	$\frac{3}{4}$	25.887	40.622
1	.136	.215	6	29.484	46.385
$\frac{1}{4}$	.268	.423	$\frac{1}{4}$	33.245	52.269
$\frac{1}{2}$	.461	.725	$\frac{1}{2}$	37.453	58.976
$\frac{3}{4}$	.731	1.147	$\frac{3}{4}$	41.875	65.712
2	1.092	1.718	7	46.520	73.659
$\frac{1}{4}$	1.553	2.437	$\frac{1}{4}$	52.230	83.426
$\frac{1}{2}$	2.133	3.355	$\frac{1}{2}$	57.587	90.598
$\frac{3}{4}$	2.834	4.447	$\frac{3}{4}$	63.377	99.453
3	3.685	5.798	8	69.889	109.552
$\frac{1}{4}$	4.677	7.340	$\frac{1}{4}$	76.864	120.717
$\frac{1}{2}$	5.852	9.207	$\frac{1}{2}$	83.840	131.883
$\frac{3}{4}$	7.185	11.276	$\frac{3}{4}$	91.209	143.130
4	8.736	13.744	9	99.242	155.734
$\frac{1}{4}$	10.455	16.406	$\frac{1}{4}$	107.754	179.292
$\frac{1}{2}$	12.429	19.569	$\frac{1}{2}$	116.719	183.159
$\frac{3}{4}$	14.410	22.597	$\frac{3}{4}$	126.186	198.015
5	17.063	26.800	10	136.136	213.628



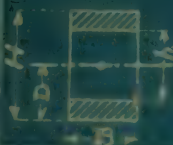









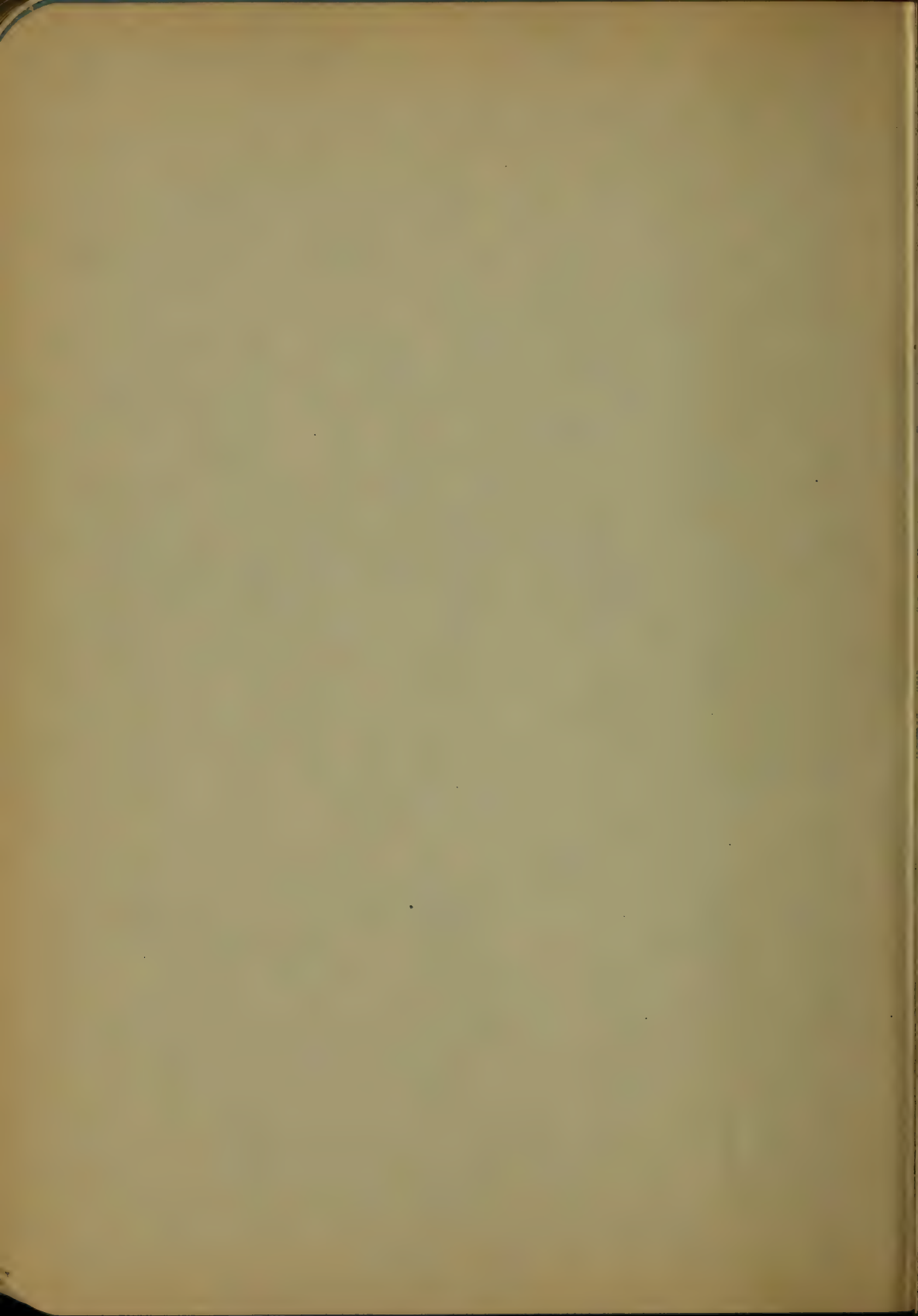


# PROPERTIES OF SECTIONS.

SECTION. AREA $A$ . EXTREME POSITION OF NEUTRAL AXIS. $D$ .	MOMENT OF INERTIA $I$	SECTION MOD- ULUS. $S = \frac{I}{D}$	RADIUS OF GYRATION $r = \sqrt{\frac{I}{A}}$
 $A = \frac{BH}{2}$ $D = \frac{2}{3} H$ $D = \frac{1}{3} H$	$I = \frac{BH^3}{36}$	$S = \frac{BH^2}{24}$	$r = \frac{H}{\sqrt{18}} = .236H$
 $A = \frac{BH}{2}$ $D = H$	$I = \frac{BH^3}{12}$	$S = \frac{BH^2}{12}$	$r = \frac{H}{\sqrt{6}} = .408H$
 $A = BH$ $D = \frac{H}{2}$	$I = \frac{BH^3}{12}$	$S = \frac{BH^2}{6}$	$r = \frac{H}{\sqrt{12}} = .289H$
 $A = BH$ $D = H$	$I = \frac{BH^3}{3}$	$S = \frac{BH^2}{3}$	$r = \frac{H}{\sqrt{3}} = .577H$
 $A = BH$ $D = \frac{H}{2}$	$I = \frac{BH^3}{12}$	$S = \frac{BH^2}{6}$	$r = \frac{H}{\sqrt{12}} = .289H$
 $A = BH$ $D = \frac{BH}{\sqrt{B^2 + H^2}}$	$I = \frac{B^3 H^3}{6(B^2 + H^2)}$	$S = \frac{B^2 H^2}{6(B^2 + H^2)}$	$r = \frac{BH}{\sqrt{6(B^2 + H^2)}}$
 $A = BH$ $D = \frac{B}{2 \sin \alpha}$	$I = \frac{BH}{12} (H^2 \cos^2 \alpha + B^2 \sin^2 \alpha)$	$S = \frac{H}{2} (H^2 \cos^2 \alpha + B^2 \sin^2 \alpha)$	$r = \frac{H}{\sqrt{12} \cos \alpha + \frac{B^2 \sin^2 \alpha}{12}}$
 $A = BH - bh$ $D = \frac{H}{2}$	$I = \frac{BH^3 - bh^3}{12}$	$S = \frac{BH^2 - bh^2}{6H}$	$r = \sqrt{\frac{BH^3 - bh^3}{12(BH - bh)}}$









# PROPERTIES OF SECTIONS.

SECTION AREA A. EXTREME POSITION OF NEUTRAL AXIS D.	MOMENT OF INERTIA I.	SECTION MODULUS $S = \frac{I}{D}$	RADIUS OF GYRATION $r = \sqrt{\frac{I}{A}}$
 $A = B(H-h)$ $D = \frac{H}{2}$	$I = \frac{B}{12} (H^3 - h^3)$	$S = \frac{B}{6H} (H^3 - h^3)$	$r = \sqrt{\frac{B(H^3 - h^3)}{12B(H-h)}}$
 $A = B^2$ $D = \frac{B}{2}$	$I = \frac{B^4}{12}$	$S = \frac{B^3}{6}$	$r = \frac{B}{\sqrt{12}} = .289B$
 $A = B^2$ $D = B$	$I = \frac{B^4}{3}$	$S = \frac{B^3}{3}$	$r = \frac{B}{\sqrt{3}} = .577B$
 $A = B^2$ $D = \frac{B}{\sqrt{2}} = .707B$	$I = \frac{B^4}{12}$	$S = \frac{B^3}{6\sqrt{2}} = .118B^3$	$r = \frac{B}{\sqrt{12}} = .289B$
 $A = B^2 - b^2$ $D = \frac{B}{2}$	$I = \frac{B^4 - b^4}{12}$	$S = \frac{B^4 - b^4}{6B}$	$r = \sqrt{\frac{B^2 - b^2}{12}}$
 $A = B^2 - b^2$ $D = \frac{B}{\sqrt{2}} = .707B$	$I = \frac{B^4 - b^4}{12}$	$S = \frac{B^4 - b^4}{12B} \sqrt{2} = .118 \frac{B^4 - b^4}{B}$	$r = \frac{B - b}{\sqrt{12}} = .289B$
 $A = \frac{B+b}{2} H$ $D = \frac{H}{2}$	$I = \frac{B^3 + 4Bb + b^3}{36(B+b)} H^3$	$S = \frac{B^3 + 4Bb + b^3}{12(B+b)} H$	$r = \frac{H}{6(B+b)} \sqrt{2(B^2 + 4Bb + b^2)}$
 $A = \frac{3\sqrt{3}}{2} R^2$ $D = R$	$I = \frac{5\sqrt{3}}{8} R^4 = .541 R^4$	$S = \frac{5}{8} R^3 = .625 R^3 = .14 d^3$	$r = .609 R = .264 d$
















SECTION AREA A EXTREME POSITION OF NEUTRAL AXIS. $\bar{D}$	MOMENT OF INERTIA I.	SECTION MODULUS $S = \frac{I}{\bar{D}}$	RADIUS OF GYRATION $r = \sqrt{\frac{I}{A}}$
 $A = \frac{3}{2} d^2 \tan 30^\circ = 0.866 d^2$ $\bar{D} = \frac{d}{2 \cos 30^\circ} = .577 d$	$I = .06 d^4 = \frac{5\sqrt{3}}{16} R^4 = .5413 R^4$	$S = .104 d^3 = .5413 R^3$	$r = .264 d$
 $A = 2 d^2 \tan 22.5^\circ = .283 d^2 = .232 R^2$ $\bar{D} = \frac{d}{2} = .924 R$	$I = .055 d^4 = \frac{1 + 2\sqrt{2}}{6} R^4 = .6381 R^4$	$S = .109 d^3 = .6906 R^3$	$r = .257 d$
FOR REGULAR POLYGONS SEE PAGE: $\bar{D} = R$ TAKING A, S AND R FOR A Pn SIDED POLYGON.	$I = \frac{A}{12} (3R^2 - \frac{S^2}{2}) = \frac{R^2 A}{4} \text{ APPROX.}$	$S = \frac{RA}{4}$	$r = \sqrt{\frac{I}{A}}$
 $A = \frac{\pi}{4} d^2 = .785 d^2$ $\bar{D} = R$	$I = \frac{\pi}{64} d^4 = .0491 d^4 = .7854 R^4$	$S = \frac{\pi}{32} d^3 = .098 d^3 = .7854 R^3$	$r = \frac{d}{4} = \frac{R}{2}$
 $A = \frac{\pi}{4} (d^2 - d_1^2) = .785 (d^2 - d_1^2)$ $\bar{D} = R$	$I = \frac{\pi}{64} (d^4 - d_1^4) = .0491 (d^4 - d_1^4)$	$S = \frac{\pi}{32} \frac{d^4 - d_1^4}{d} = .098 \frac{d^4 - d_1^4}{d}$	$r = \frac{\sqrt{d^2 + d_1^2}}{4}$
 $A = \frac{\pi}{8} d^2 = .393 d^2$ $\bar{D} = .5755 R$ $\bar{D} = .4244 R$	$I = .110 R^4$	$S = .19 R^3$ $S = .26 R^3$	$r = .132 d$
 $\bar{D} = \frac{A}{3t} \frac{R^2 + R^2 + N^2}{R + N}$ $\bar{D}' = R - \bar{D}$ $A = .785 (R^2 - N^2)$	$I = .3TR^3 \text{ APPROX.}$	$S = \frac{I}{\bar{D}}$	$r = \sqrt{\frac{I}{A}}$
 $A = \frac{\pi}{4} B d^2 = .785 B d^2$ $\bar{D} = \frac{d}{2}$	$I = \frac{\pi}{64} B d^4 = .049 B d^4$	$S = \frac{\pi}{32} B d^3 = .098 B d^3$	$r = \frac{d}{4}$
 $A = \frac{\pi}{4} (B d^2 - B d_1^2) = .785 (B d^2 - B d_1^2)$ $\bar{D} = \frac{d}{2}$	$I = .049 (B d^4 - B d_1^4)$	$S = .098 \frac{B d^4 - B d_1^4}{d - d_1}$	$r = \sqrt{\frac{I}{A}}$












SECTION. AREA EXTREME POSITION OF NEUTRAL AXIS $\bar{D}$	MOMENT OF INERTIA $I$ .	SECTION MODULUS $S = \frac{I}{\bar{D}}$
 $A = td + 2b's$ $\bar{D} = \frac{d}{2}$	$I = \frac{1}{12} [bd^3 + \frac{1}{3} (h^4 - t^4)]$ $\bar{y} = \frac{1}{6} \text{ STANDARD SLOP}$	$S = \frac{2I}{d}$
 $A = td + 2b'(s+n')$ $\bar{D} = \frac{d}{2}$	$I = \frac{1}{12} [b^3(d-h) + t^3 + \frac{1}{3} (b^4 - t^4)]$	$S = \frac{2I}{d}$
 $A = td + b'(s+n')$ $\bar{D} = \frac{d}{2}$	$I = \frac{1}{12} [bd^3 - \frac{1}{8} (h^4 - t^4)]$ $\bar{y} = \frac{1}{6} \text{ STANDARD SLOP OR CAMBRIAST CO.}$	$S = \frac{2I}{d}$
 $A = td + b'(s+n')$ $\bar{D} = b - D'$	$I = \frac{1}{3} [2sb^3 + t^3 + \frac{1}{2} (b^4 - t^4)]$ $\bar{y} = \frac{1}{6} \text{ SLOP. } -AD'^2$	$S = \frac{I}{b - \bar{D}}$
 $\bar{D} = \frac{d}{2}$ $A = bd - h(b-t)$	$I = \frac{bd^3 - h^3(b-t)}{12}$	$S = \frac{bd^3 - h^3(b-t)}{6d}$
 $A = td + sb$ $\bar{D} = \frac{d}{2}$	$I = \frac{td^3 + bs^3}{12}$	$S = \frac{td^3 + bs^3}{6d}$
 $A = bd - h(b-t)$ $\bar{D} = \frac{d}{2}$	$I = \frac{2sb^3 + ht^3}{12}$	$S = \frac{2sb^3 + ht^3}{6b}$
 $A = bd - h(b-t)$ $\bar{D} = b - D'$	$I = \frac{2sb^3 + ht^3}{3} - AD'^2$	$S = \frac{I}{b - \bar{D}'}$
 $A = td + s(b-t)$ $\bar{D} = \frac{d}{2}$	$I = \frac{td^3 + s^3(b-t)}{12}$	$S = \frac{td^3 + s^3(b-t)}{6d}$







SECTION. AREA $A$ EXTREME POSITION OF NEUTRAL AXIS. $D, D'$	MOMENT OF INERTIA $I$	SECTION MODULUS $S, \frac{I}{D}$
 $A = bd - b_1h_1$	$I = \frac{(bd^3 - b_1h_1^3) - 4b_1d_1h_1(d - h_1)}{12(bd - b_1h_1)}$ $D = \frac{h}{2} + \frac{b_1h_1(d - h_1)}{2(bd - b_1h_1)}$	$S = \frac{I}{D}$
 $A = bs + ht$ $D' = \frac{d^2t + s^2(b-t)}{2A}$ $D = d - D'$	$I = \frac{tD^3 + bD'^3 - (b-t)(D'-s)^3}{3}$	$S = \frac{I}{d - D'}$
 $A = bs + ht + b's'$ $D' = \frac{td^2 + s^2(b-t) + s(b'-t)(d-s)}{2A}$ $D = d - D'$	$I = \frac{bD'^3 + b's'^3 - (b-t)(D'-s)^3}{3}$	$S = \frac{I}{d - D'}$
 $A = bs + ht + b's'$ $D' = \frac{3bs^2 + 3th^2 + h(h-t)(h+3s)}{6A}$ $D = d - D'$	$I = \frac{4bs^3 + h^3(3t+t')}{12} - A(D'-s)^2$	$S = \frac{I}{d - D'}$
 $A = \frac{\pi}{4}d^2 + 2b(h-d)$ $D = \frac{h}{2}$	$I = \frac{1}{12} \left[ \frac{\pi d^4}{16} + b(h^3 - d^3) + b^3(h-d) \right];$ $\frac{3\pi}{16} = .589;$	$S = \frac{1}{6h} \left[ .589d^4 + b(h^3 - d^3) + b^3(h-d) \right]$
	$I = \frac{1}{12} \left[ b_1(h_1^3 - h_2^3) + b_2(h_2^3 - h_1^3) + t h_3^3 \right];$ $b_1 \text{ AND } b_2 \text{ ARE LESS THE RIVET HOLES.}$	$S = \frac{2I}{h}$
	$I = \frac{1}{12} \left[ b_1(h_1^3 - h_2^3) + b_2(h_2^3 - h_1^3) + t h_3^3 \right] - \frac{1}{2} d b^2 \left( \frac{h_2 + h_3}{2} \right)^2$ $\text{FOR RIVET HOLE}$	$S = \frac{2I}{h_1}$
	$I = (.103 + .186 \frac{h}{b}) \frac{1}{25.4} h^2 t$	$S = (.169 + .351 \frac{h}{b}) \frac{1}{25.4} h t$
 <p>FOR STANDARD RAILS</p>	$I = .0126 h^4$ $h = \text{HEIGHT OF RAILS IN INCHES.}$	$S = .0063 h^3$



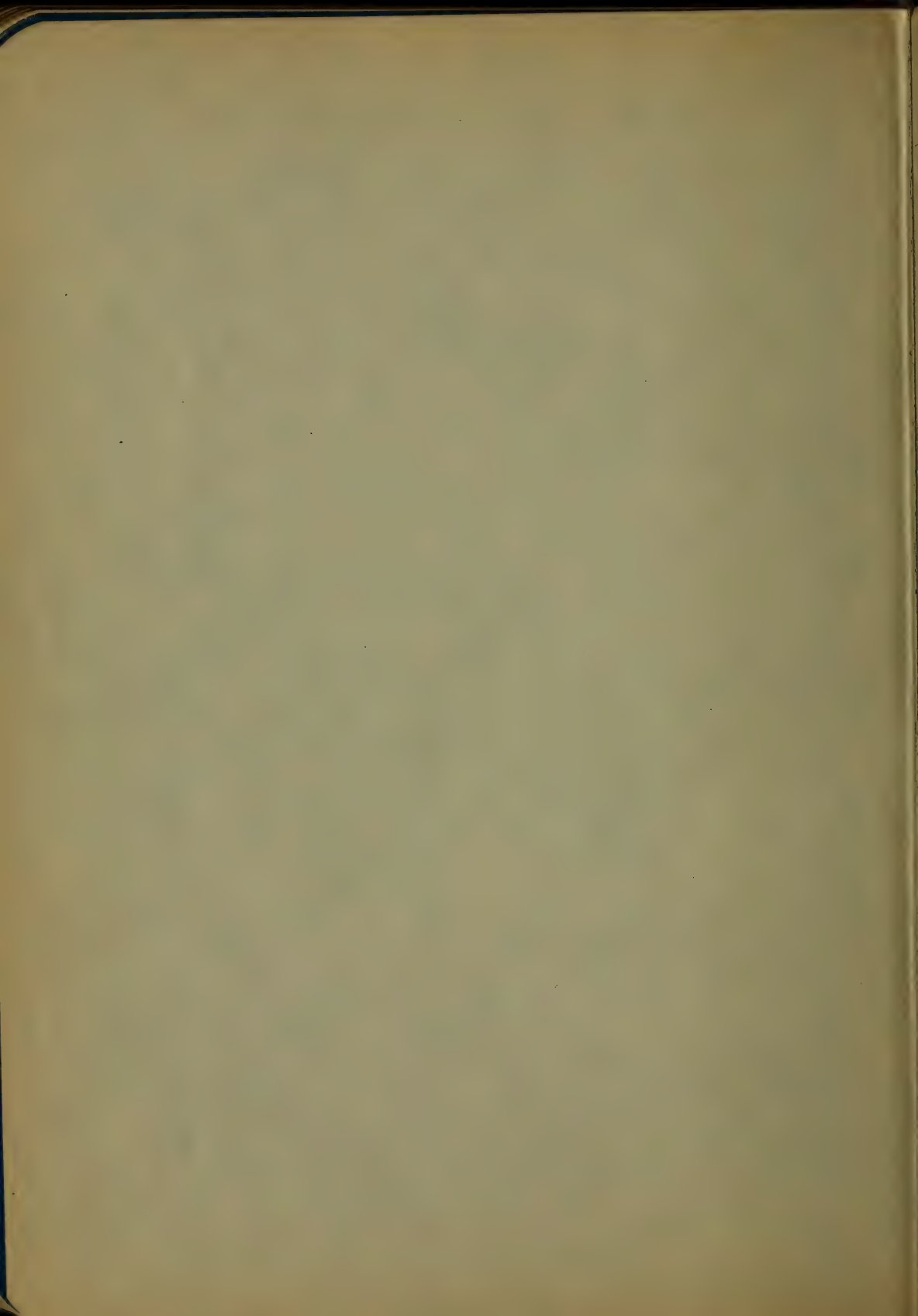
# MOMENTS OF INERTIA OF RECTANGLES.

MOMENT OF INERTIA =  $\frac{WD^3}{12}$  IN INCHES<sup>4</sup>.

SECTION MODULUS =  $\frac{WD^2}{6}$  IN INCHES<sup>3</sup> RADIUS OF GYRATION =  $.289D$  IN INCH.

WIDTH OF RECTANGLE IN INCHES

DEPTH OF RECTANGLE IN INCHES	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
1	.17	.21	.25	.29	.33	.38	.42	.50	.58	.67
2	.56	.70	.84	.98	1.13	1.27	1.41	1.69	1.67	2.25
3	1.33	1.67	2.00	2.33	2.67	3.00	3.33	4.00	4.67	5.33
4	2.40	3.26	3.91	4.66	5.21	5.86	6.51	7.81	9.11	10.42
5	4.50	5.62	6.75	7.88	9.00	10.13	11.25	13.50	15.75	18.00
6	7.45	8.93	10.72	12.51	14.29	16.08	17.86	21.44	25.01	28.58
7	10.67	13.33	16.00	18.67	21.33	24.00	26.67	32.00	37.33	42.67
8	15.14	18.98	22.78	26.58	30.38	34.17	37.97	45.56	53.16	60.75
9	20.83	26.04	31.25	36.46	41.67	46.87	52.08	62.50	72.92	83.33
10	27.73	34.66	41.59	48.53	55.46	62.39	69.32	83.19	97.05	110.92
11	36.00	45.00	54.00	63.00	72.00	81.00	90.00	108.00	126.00	144.00
12	45.77	57.21	68.66	80.11	91.54	102.98	114.43	137.31	160.20	183.08
13	57.17	71.46	85.75	100.04	114.33	128.63	142.93	171.50	200.08	228.67
14	70.34	87.89	105.47	123.05	140.63	158.21	175.78	210.44	246.09	281.75
15	85.33	106.67	128.00	149.33	170.67	192.00	213.33	256.00	298.67	341.33
16	102.33	127.94	153.53	179.12	204.71	230.30	255.89	307.06	358.24	409.42
17	121.50	151.83	182.25	212.63	243.00	273.38	303.75	364.50	425.25	486.00
18	142.90	178.62	214.34	250.07	285.79	321.52	357.24	428.69	500.14	571.58
19	166.67	208.33	250.00	291.67	333.33	375.00	416.67	500.00	583.33	666.67
20	192.94	241.17	289.41	337.44	385.88	434.11	482.34	578.81	675.28	771.75
21	221.83	277.29	332.75	388.21	443.67	499.13	554.58	665.50	776.42	887.33
22	253.48	316.83	380.20	443.59	506.96	570.33	633.70	760.44	887.18	1013.92
23	288.00	360.00	432.00	504.00	576.00	648.00	720.00	864.00	1008.00	1152.00
24	325.32	406.90	488.30	569.65	651.04	732.42	813.80	976.56	1139.32	1302.08
25	366.17	457.71	549.30	640.48	732.33	823.88	915.42	1098.80	1281.38	1464.67
26	410.00	512.53	615.06	717.61	820.13	922.64	1025.16	1230.19	1435.22	1640.25
27	457.33	571.67	683.90	800.33	914.67	1029.00	1143.33	1372.00	1600.67	1829.33
28	508.10	635.13	762.15	889.18	1016.21	1145.23	1270.26	1524.31	1778.36	2032.42
29	562.50	703.13	843.75	984.38	1125.50	1265.63	1406.25	1687.50	1968.75	2260.00
30	620.67	785.33	924.00	1104.70	1305.00	1536.00	1706.67	2048.00	2389.33	2730.67
31	682.83	853.59	1024.80	1232.90	1407.70	1637.70	1842.40	2246.60	2655.92	3026.33
32	748.00	928.00	1104.00	1320.00	1500.00	1740.00	1980.00	2400.00	2880.00	3360.00
33	816.17	1008.17	1194.17	1416.17	1602.17	1848.17	2094.17	2556.17	3018.17	3480.17
34	888.33	1093.33	1288.33	1513.33	1708.33	1954.33	2200.33	2676.33	3152.33	3628.33
35	964.50	1184.50	1389.50	1620.50	1815.50	2061.50	2307.50	2804.50	3280.50	3756.50
36	1044.67	1280.67	1495.67	1737.67	1932.67	2178.67	2424.67	2931.67	3407.67	3883.67
37	1128.83	1382.83	1608.83	1864.83	2059.83	2305.83	2551.83	3068.83	3544.83	4020.83
38	1217.00	1490.00	1726.00	1992.00	2207.00	2453.00	2700.00	3227.00	3703.00	4179.00
39	1309.17	1602.17	1854.17	2129.17	2324.17	2570.17	2816.17	3353.17	3829.17	4295.17
40	1333.33	1666.67	2000.00	2333.33	2666.67	3000.00	3333.33	4000.00	4666.67	5333.33
42	1548.50	1924.50	2300.50	2701.50	3087.50	3473.50	3859.50	4630.50	5402.50	6174.50
44	1779.17	2218.33	2662.00	3105.70	3549.30	3993.00	4436.67	5324.00	6211.33	7098.67
46	2027.33	2534.83	3041.70	3548.70	4055.70	4562.63	5069.58	6083.50	7097.42	8111.33
48	2304.00	2880.00	3456.00	4032.00	4608.00	5184.00	5760.00	6912.00	8064.00	9216.00
50	2604.17	3265.33	3906.50	4557.67	5208.83	5859.90	6510.42	7812.50	9114.58	10416.67
52	2928.33	3661.67	4398.00	5126.20	5838.70	6591.00	7323.33	8788.00	10252.67	11717.33
54	3280.00	4100.00	4920.00	5740.00	6511.00	7381.13	8201.25	9841.50	11481.75	13122.00
56	3658.83	4573.83	5488.00	6402.70	7317.30	8232.00	9146.67	10776.00	12505.33	14334.67
58	4064.83	5081.44	6097.30	7113.50	8129.70	9145.87	10162.08	12174.50	14226.92	16259.33
60	4500.00	5625.00	6750.00	7875.00	9000.00	10125.00	11250.00	13500.00	15750.00	18000.00







# BENDING MOMENTS AND DEFLECTIONS FOR BEAMS OF UNIFORM SECTION.

M = BENDING MOMENT.

FORMULAE.

$L_P$  = SAFE LOAD.

W = TOTAL LOAD IN LBS. UNIFORMLY DIST.

$W_1$  = " LIVE LOAD IN LBS. "

$W_2$  = " DEAD " " " " "

$P_1, P_2, P_3$  = LOAD CONCENTRATED AT ANY POINTS

M = TOTAL BENDING MOMENT IN INCH. LBS.

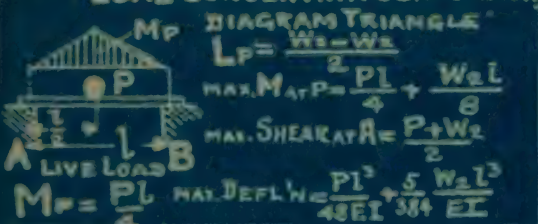
$M_1, M_2, M_3$  = BEND. MOMENTS DUE TO  $W_1, W_2$  OR P.

I = MOMENT OF INERTIA; E = MOD. ELASTICITY =

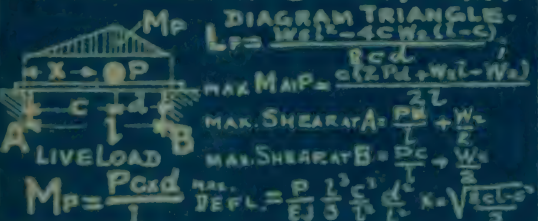
E = 29,000,000 FOR STEEL.  $W_2$  = TOTAL SAFE LOAD

FOR LIVE LOAD ONLY. MAKE  $W_2 = 0$ .

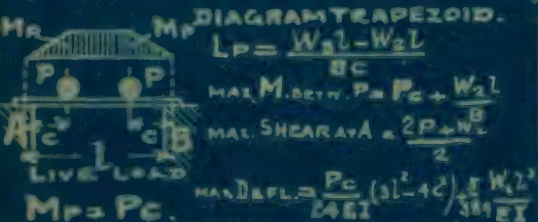
## BEAM SUPPORTED AT BOTH ENDS. LOAD CONCENTRATED AT CENTER.



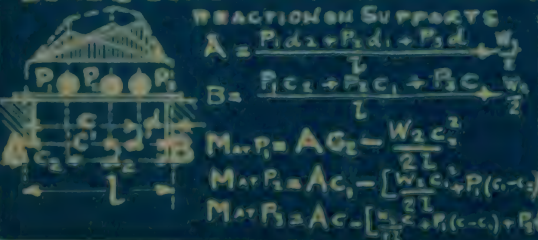
## BEAM SUPP'D AT BOTH ENDS. LOAD CONCENT'D AT ANY POINT.



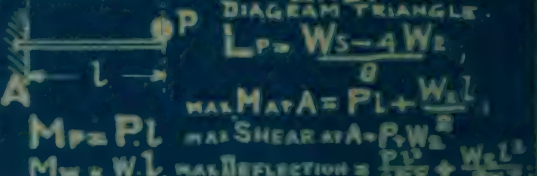
## BEAM SUPP'D AT BOTH ENDS WITH TWO SYMMETRICAL LOADS.



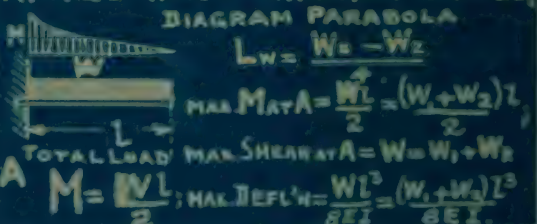
## BEAM SUPP'D AT BOTH ENDS WITH LOADS CONC'D AT VARIOUS POINTS.



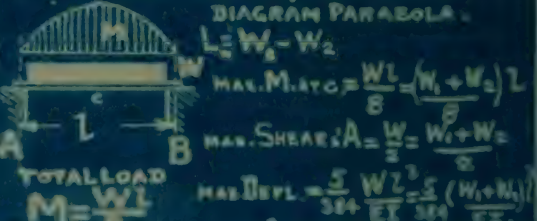
## BEAM FIXED AT ONE END AND UNSUPPORTED AT THE OTHER. LOAD CONCENTRATED AT FREE END.



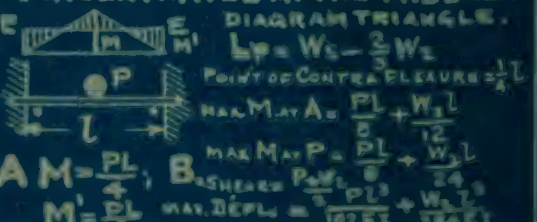
## BEAM FIXED AT ONE END, UNSUPP'D AT THE OTHER & UNIFORMLY LOADED.



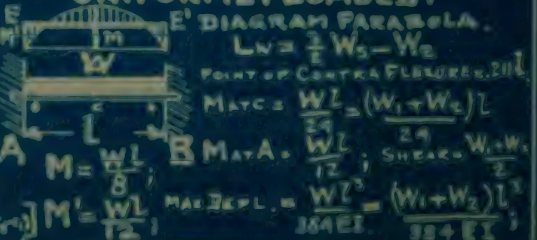
## BEAM SUPP'D AT BOTH ENDS & UNIFORMLY LOADED.



## BEAM FIXED AT BOTH ENDS, LOAD CONCENTRATED AT THE MIDDLE.



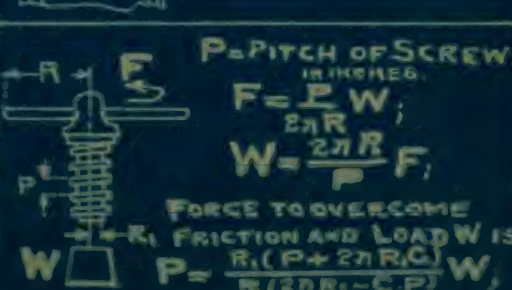
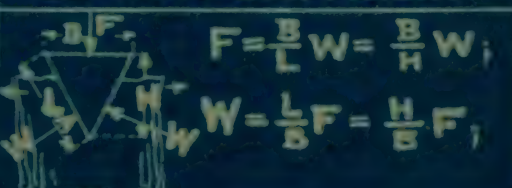
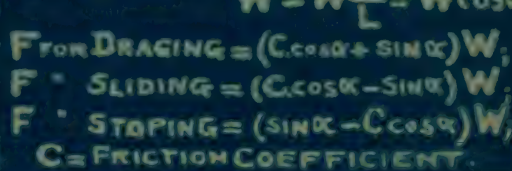
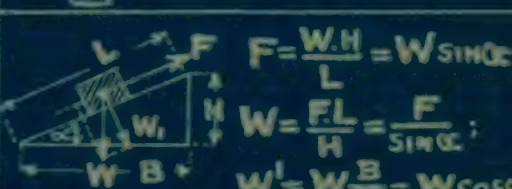
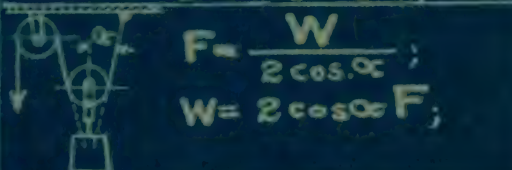
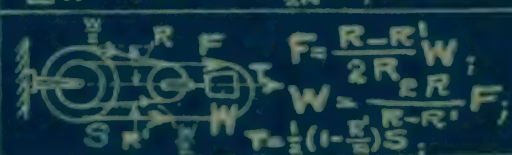
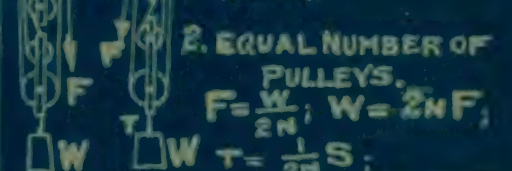
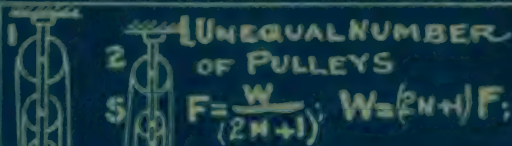
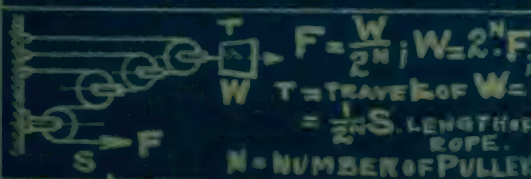
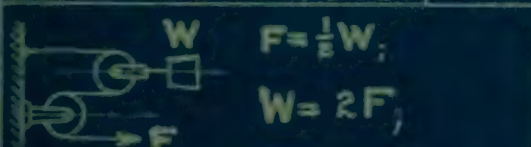
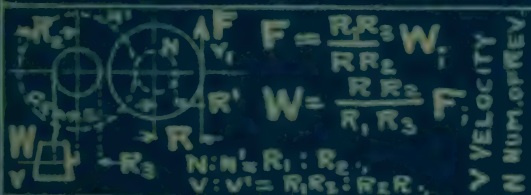
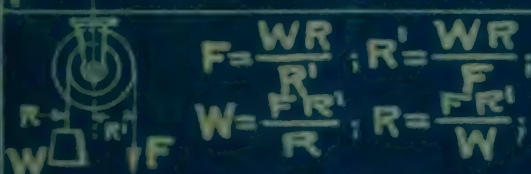
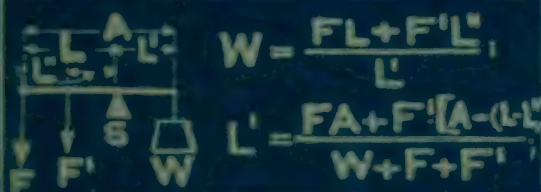
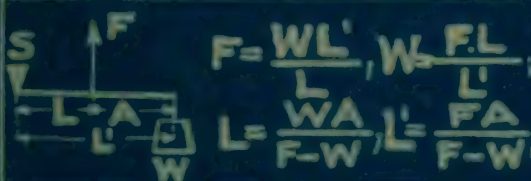
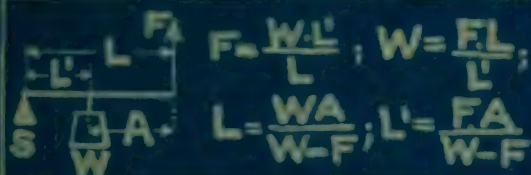
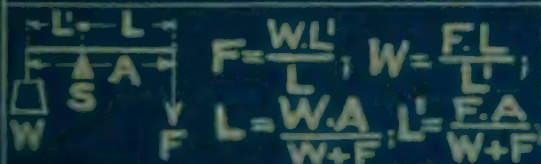
## BEAM FIXED AT BOTH ENDS AND UNIFORMLY LOADED.





## MECHANICAL POWERS.

N = NUMBER OF REVOLUTIONS OR NUM. OF PULLEYS.  $\alpha$  = ANGLE.  
C = FRICTION COEFFICIENT. V = VELOCITY OF WEIGHT, LOAD OR FORCE.









# WEIGHTS AND MEASURES.

## AVOIRDUPOIS WEIGHT.

GRAINS. DRAMS. OUNCES. POUNDS. HUNDRED-  
WEIGHT IN A GROSSTON.

GRAINS.	DRAMS.	OUNCES.	POUNDS.	HUNDRED- WEIGHT.	GROSSTONS.
1.	.0366	.002286	.00043	.00000128	.000000176
27.344	1.000	.06250	.00391	.00003488	.000001744
437.50	16.000	1.0000	.0625	.00055804	.00002790
7000.00	256.000	16.0000	1.000	.0089286	.0004464
784000.00	28672.000	1792.000	112.000	1.000	.050
5680000.00	573440.00	35840.00	2240.000	20.000	1.000

ONE NET TON = 2000 LBS. = .892857 GROSSTONS.

ONE POUND AVOIRDUPOIS = 1.21528 POUNDS TROY WEIGHT.

ONE GRAIN AVOIRDUPOIS = ONE GRAIN TROY = ONE GRAIN IN  
APOTHECARIES WEIGHT.

## TROY WEIGHT.

GRAINS. PENNYWEIGHT. OUNCES IN A POUND.

GRAINS.	PENNYWEIGHT.	OUNCES.	POUNDS.
1	.041667	.0020833	.0001736
24	1.000	.050	.0041667
480	20.000	1.000	.0833333
5760	240.000	12.000	1.000

## APOTHECARIES' WEIGHT.

GRAINS. SCRUPLES. DRAMS. OUNCES IN A POUND.

GRAINS.	SCRUPLES.	DRAMS.	OUNCES.	POUNDS.
1	.05	.016667	.0020833	.00017361
20	1.00	.333333	.0416667	.0034722
60	3.00	1.000	.125	.0104167
480	24.00	8.000	1.000	.08333333
5760	288.00	96.000	12.000	1.000





# LINEAR MEASURE.

DECIMALS OF AN INCH FOR EACH  $\frac{1}{64}$  TH.

$\frac{1}{32}$ DS.	$\frac{1}{64}$ THS.	DECIMAL	FRACTION.	$\frac{1}{32}$ DS.	$\frac{1}{64}$ THS.	DECIMAL	FRACTION.
	1	.015625			33	.515625	
1	2	.03125		17	34	.53125	
	3	.046875			35	.546875	
2	4	.0625	$\frac{1}{16}$	18	36	.5625	$\frac{9}{16}$
	5	.078125			37	.578125	
3	6	.09375		19	38	.59375	
	7	.109375			39	.609375	
4	8	.125	$\frac{1}{8}$	20	40	.625	$\frac{5}{8}$
	9	.140625			41	.640625	
5	10	.15625		21	42	.65625	
	11	.171875			43	.671875	
6	12	.1875	$\frac{3}{16}$	22	44	.6875	$\frac{11}{16}$
	13	.203125			45	.703125	
7	14	.21875		23	46	.71875	
	15	.234375			47	.734375	
8	16	.25	$\frac{1}{4}$	24	48	.75	$\frac{3}{4}$
	17	.265625			49	.765625	
9	18	.28125		25	50	.78125	
	19	.296875			51	.796875	
10	20	.3125	$\frac{5}{16}$	26	52	.8125	$\frac{13}{16}$
	21	.328125			53	.828125	
11	22	.34375		27	54	.84375	
	23	.359375			55	.859375	
12	24	.375	$\frac{3}{8}$	28	56	.875	$\frac{7}{8}$
	25	.390625			57	.890625	
13	26	.40625		29	58	.90625	
	27	.421875			59	.921875	
14	28	.4375	$\frac{7}{16}$	30	60	.9375	$\frac{15}{16}$
	29	.453125			61	.953125	
15	30	.46875		31	62	.96875	
	31	.484375			63	.984375	
16	32	.5	$\frac{1}{2}$	32	64	1.0000	1



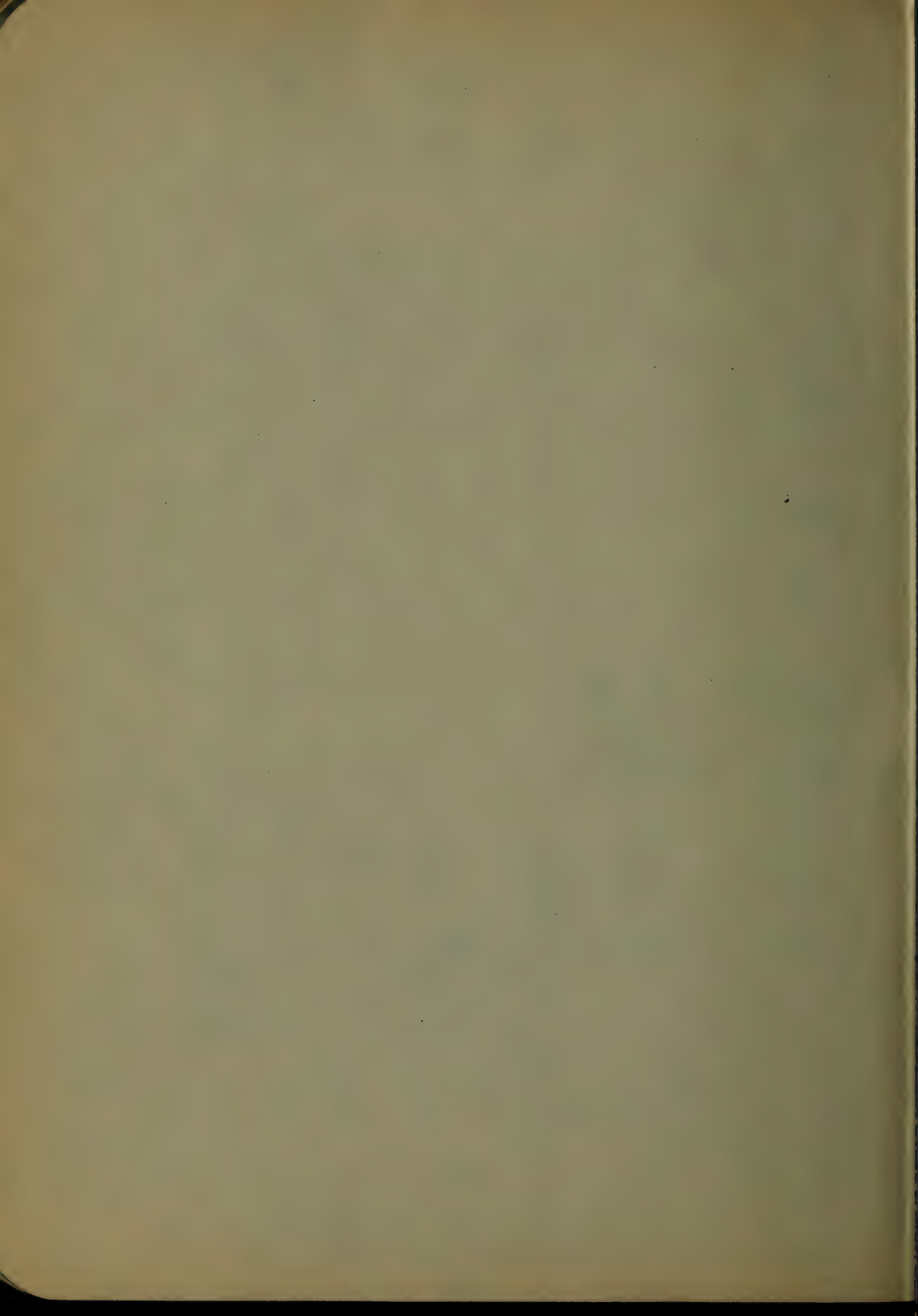


# DECIMALS OF A FOOT FOR EACH $\frac{1}{64}$ OF AN INCH.

INCH.	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0	0	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
$\frac{1}{64}$	.0013	.0846	.1680	.2513	.3346	.4180	.5013	.5846	.6680	.7513	.8346	.9180
$\frac{2}{64}$	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193
$\frac{3}{64}$	.0039	.0872	.1706	.2539	.3372	.4206	.5039	.5872	.6706	.7539	.8372	.9206
$\frac{4}{64}$	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
$\frac{5}{64}$	.0065	.0898	.1732	.2565	.3398	.4232	.5065	.5898	.6732	.7565	.8398	.9232
$\frac{6}{64}$	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245
$\frac{7}{64}$	.0091	.0924	.1758	.2591	.3424	.4258	.5091	.5924	.6768	.7601	.8424	.9258
$\frac{8}{64}$	.0104	.0937	.1771	.2604	.3437	.4271	.5104	.5937	.6771	.7604	.8437	.9271
$\frac{9}{64}$	.0117	.0951	.1784	.2617	.3451	.4284	.5117	.5951	.6784	.7617	.8451	.9284
$\frac{10}{64}$	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297
$\frac{11}{64}$	.0143	.0977	.1810	.2643	.3477	.4310	.5143	.5977	.6810	.7643	.8477	.9310
$\frac{12}{64}$	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
$\frac{13}{64}$	.0169	.1003	.1836	.2669	.3503	.4336	.5169	.6003	.6836	.7669	.8503	.9336
$\frac{14}{64}$	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349
$\frac{15}{64}$	.0195	.1029	.1862	.2695	.3529	.4362	.5195	.6029	.6862	.7695	.8529	.9362
$\frac{16}{64}$	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
$\frac{17}{64}$	.0221	.1055	.1888	.2721	.3555	.4388	.5221	.6055	.6888	.7721	.8555	.9388
$\frac{18}{64}$	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401
$\frac{19}{64}$	.0247	.1081	.1914	.2747	.3581	.4414	.5247	.6081	.6914	.7747	.8581	.9414
$\frac{20}{64}$	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
$\frac{21}{64}$	.0273	.1107	.1940	.2773	.3607	.4440	.5273	.6107	.6940	.7773	.8607	.9440
$\frac{22}{64}$	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453
$\frac{23}{64}$	.0299	.1133	.1966	.2799	.3633	.4466	.5299	.6133	.6966	.7799	.8633	.9466
$\frac{24}{64}$	.0312	.1146	.1979	.2812	.3646	.4479	.5312	.6146	.6979	.7812	.8646	.9479
$\frac{25}{64}$	.0326	.1159	.1992	.2826	.3659	.4492	.5326	.6159	.6992	.7826	.8659	.9492
$\frac{26}{64}$	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505
$\frac{27}{64}$	.0352	.1185	.2018	.2852	.3685	.4518	.5352	.6185	.7018	.7865	.8685	.9518
$\frac{28}{64}$	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7878	.8698	.9531
$\frac{29}{64}$	.0378	.1211	.2044	.2878	.3711	.4544	.5378	.6211	.7044	.7891	.8711	.9544
$\frac{30}{64}$	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7904	.8724	.9557









# INCHES, FEET, YARDS, RODS & FURLONGS IN AN ENGLISH MILE.

INCHES.	FEET.	YARDS.	RODS.	FURLONG.	MILE.
1	.0833	.0277	.00505	.000126	.0000157
12	1.000	.3333	.06060	.001515	.0001890
36	3.000	1.000	.18181	.00454	.0005682
192	16.500	5.500	1.000	.025	.003125
7920	660.000	220.000	40.000	1.000	.125
63360	5280.00	1760.00	320.000	8.000	1.000

## GUNTER'S CHAIN.

1 CHAIN = 100 LINKS = 66 FEET = 4 RODS = .0125 MILES.

1 LINK = 7.92 INCHES = .01 CHAIN = .000125 MILES.

1 MILE = 80 CHAINS = 8000 LINKS.

## ROPE AND CABLE MEASURE.

1 CABLE = 120 FATHOMS = 720 FEET = 960 SPANS = 8640 "

1 FATHOM = 6 FEET = 8 SPANS = 72 INCHES = .00833 CABLE.

1 SPAN = 9 INCHES = .125 FATHOMS = .0010416 CABLE'S LENGTH.

1 INCH = .1111 SPAN = .01388 FATH. = .0001157 CABLE'S LENGTH.

## NAUTICAL MEASURE.

1 NAUTICAL MILE = 6080.204 FEET = 1.1516 STATUTE MILE; - ADOPTED BY THE U.S. COAST AND GEODETIC SURVEY AS THE LENGTH OF ONE MINUTE OF ARC OF A CIRCLE ON A SPHERE WHOSE SURFACE EQUALS THAT OF THE EARTH

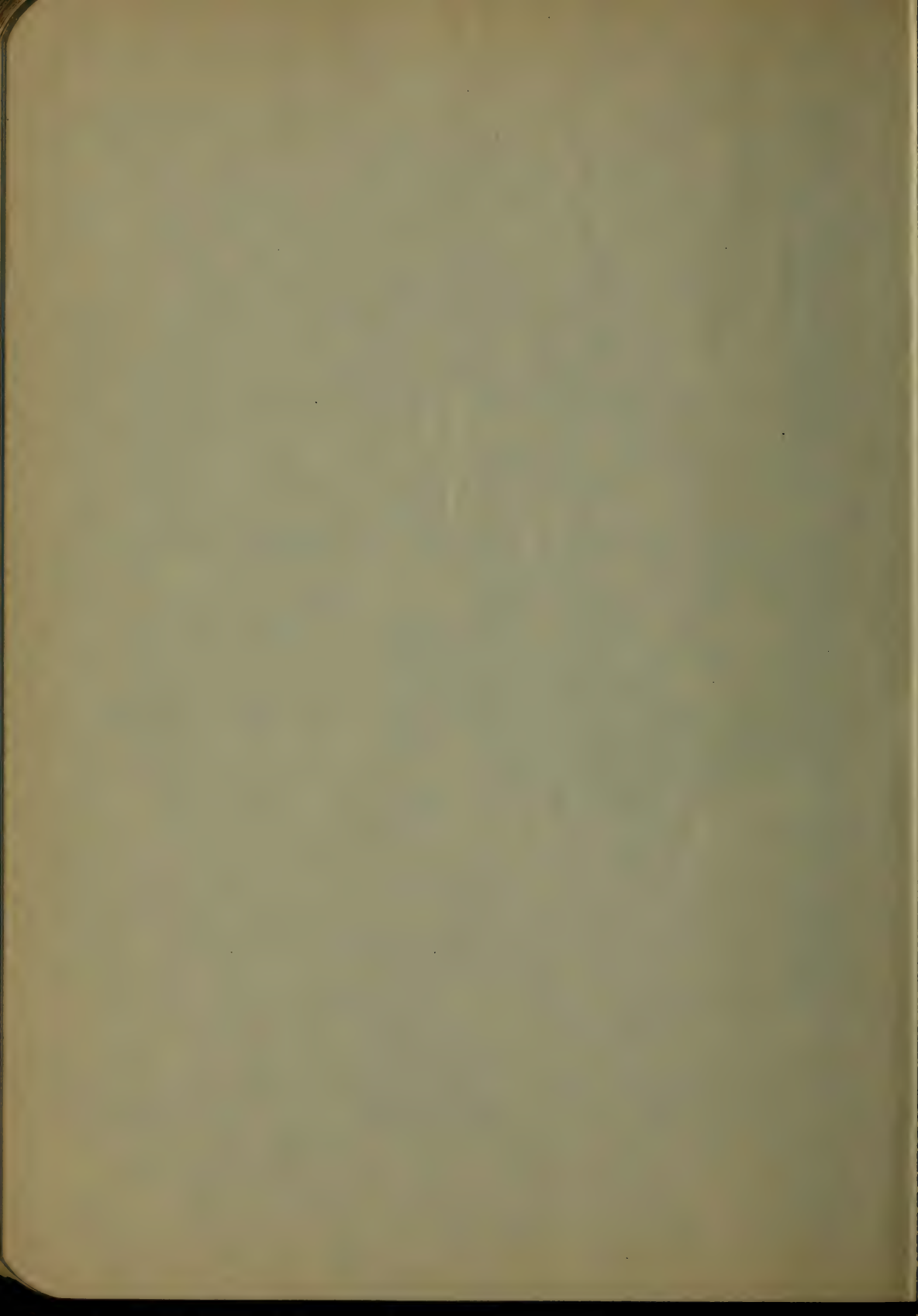
1 LEAGUE = 3 NAUT. MILES = 18240.613 FEET.

## SURFACE MEASURE.

SQU. INCH'S	SQU. FEET.	SQU. YARDS	SQU. RODS	ACRES.	SQU. MILE.
1	.00694	.00077	. . . .	. . . .	. . . .
144	1.00	.1111	. . . .	. . . .	. . . .
1296	9.00	1.00	.03306	.0002066	. . . .
39204	272.25	30.25	1.00	.00625	.0000097
6272640	43560.00	4840.00	160.00	1.00	.0015625
	27878400	3097600.0	102400.00	640.00	1.00

1 SQU. ROD = 40 SQU. RODS. = .25 ACRE. 1 SQU. ACRE = 208.7 Ft. SQU.





## CUBIC MEASURE.

CUBIC INCHES. CUBIC FEET IN A CUBIC YARD.

CUB. INCHES.	CUB. FEET.	CUB. YARDS.
1	.0005787	.000021433
864	.500	.01851852
1728	1.000	.03703704
2916.125	1.6875	.06250 or $\frac{1}{6}$
5832.25	3.375	.125 " $\frac{1}{8}$
11864.5	6.750	.25 " $\frac{1}{4}$
17796.75	10.125	.375 " $\frac{3}{8}$
23329.—	13.5	.5 " $\frac{1}{2}$
29161.25	16.875	.625 " $\frac{5}{8}$
34993.5	20.25	.75 " $\frac{3}{4}$
40825.75	23.625	.875 " $\frac{7}{8}$
46658.—	27.000	1.000 YARDS.

ONE CORD OF WOOD = 128 CUB. FEET = 4 FT. X 4 FT. X 8 FT.

ONE PERCH OF MASONRY = 24.75 CUB. FT. = 16.5 FT. X 1.5 FT. X 1 FT.

## DRY MEASURE.

PINTS. QUARTS. GALLONS. PECKS. IN A BUSHEL, AND ITS EQUIVALENT IN CUB. INCHES AND CUB. FEET.

PINTS	QUARTS.	GALLONS.	PECKS.	BUSHEL	CUB. INCHES.	CUB. FEET.
1	.50	.125	.0625	.015625	28.600313	.019422
2	1.00	.25	.125	.03125	67.20063	.038844
4	2.00	.50	.25	.0625	134.40125	.077688
8	4.00	1.00	.500	.125	268.8025	.155376
16	8.00	2.00	1.000	.25	537.605	.310752
64	32.00	8.00	4.000	1.00	2150.420	1.243008

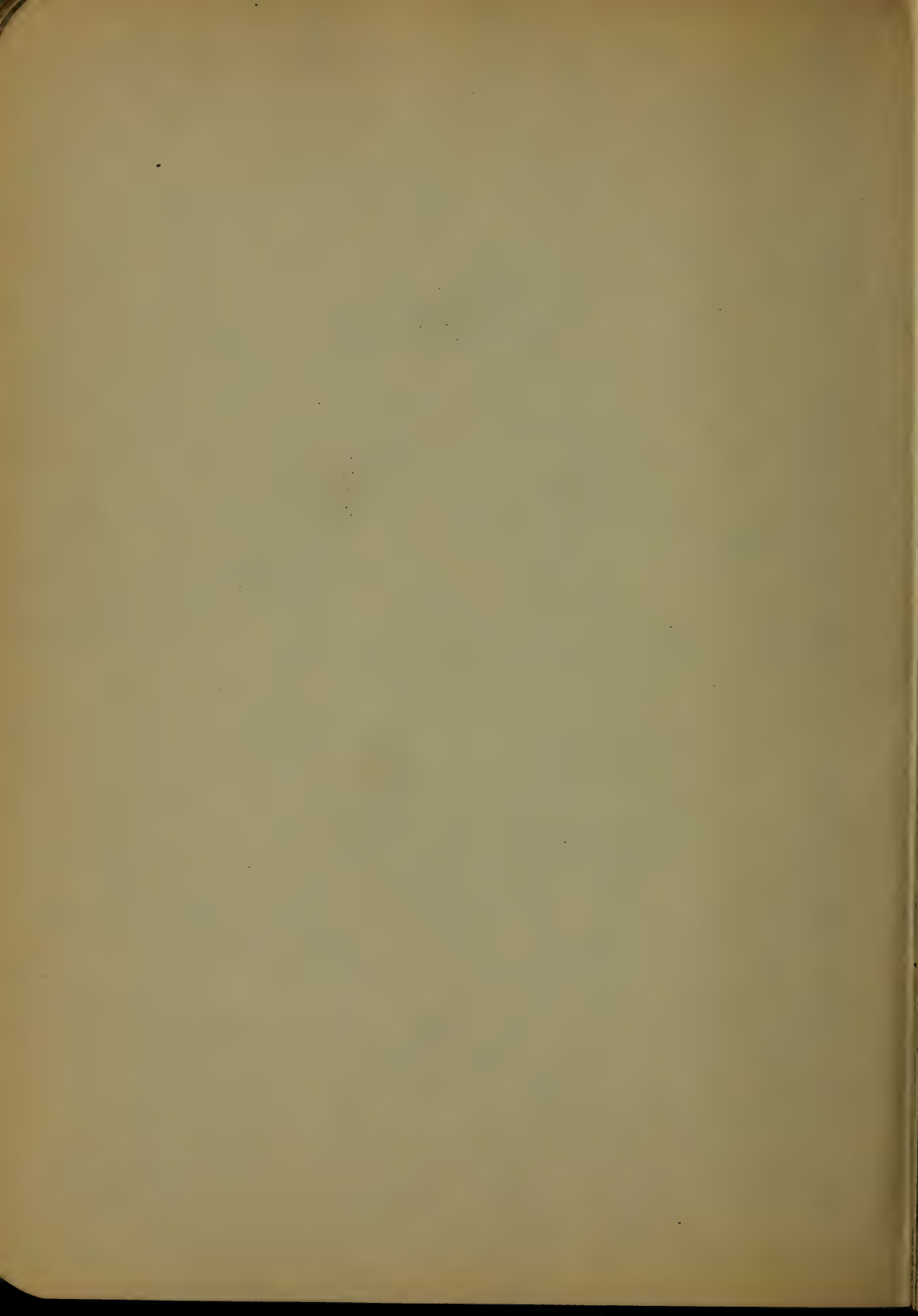
ONE HEAPED BUSHEL =  $1\frac{1}{4}$  STRUCK BUSHEL, IF THE CONE IS  $5\frac{3}{4}$  IN.

## LIQUID MEASURE.

GILLS. PINTS. QUARTS. GALLONS IN A BARREL AND ITS EQUIVALENT IN CUB. INCHES AND CUB. FEET.

GILLS.	PINTS.	QUARTS.	GALLONS.	BARRELS	CUB. INCH.	CUB. FEET.
1	.25	.125	.03125	.000498	7.21875	.0041775
4	1.00	.500	.125	.003968	28.875	.0167100
8	2.00	1.00	.25	.007937	57.75	.0334200
32	8.00	4.00	1.00	.031746	231.00	.1336797
2008	252.00	126.00	31.50	1.000	7276.50	4.2103

ONE FLUID OUNCE = .0625 PINTS.







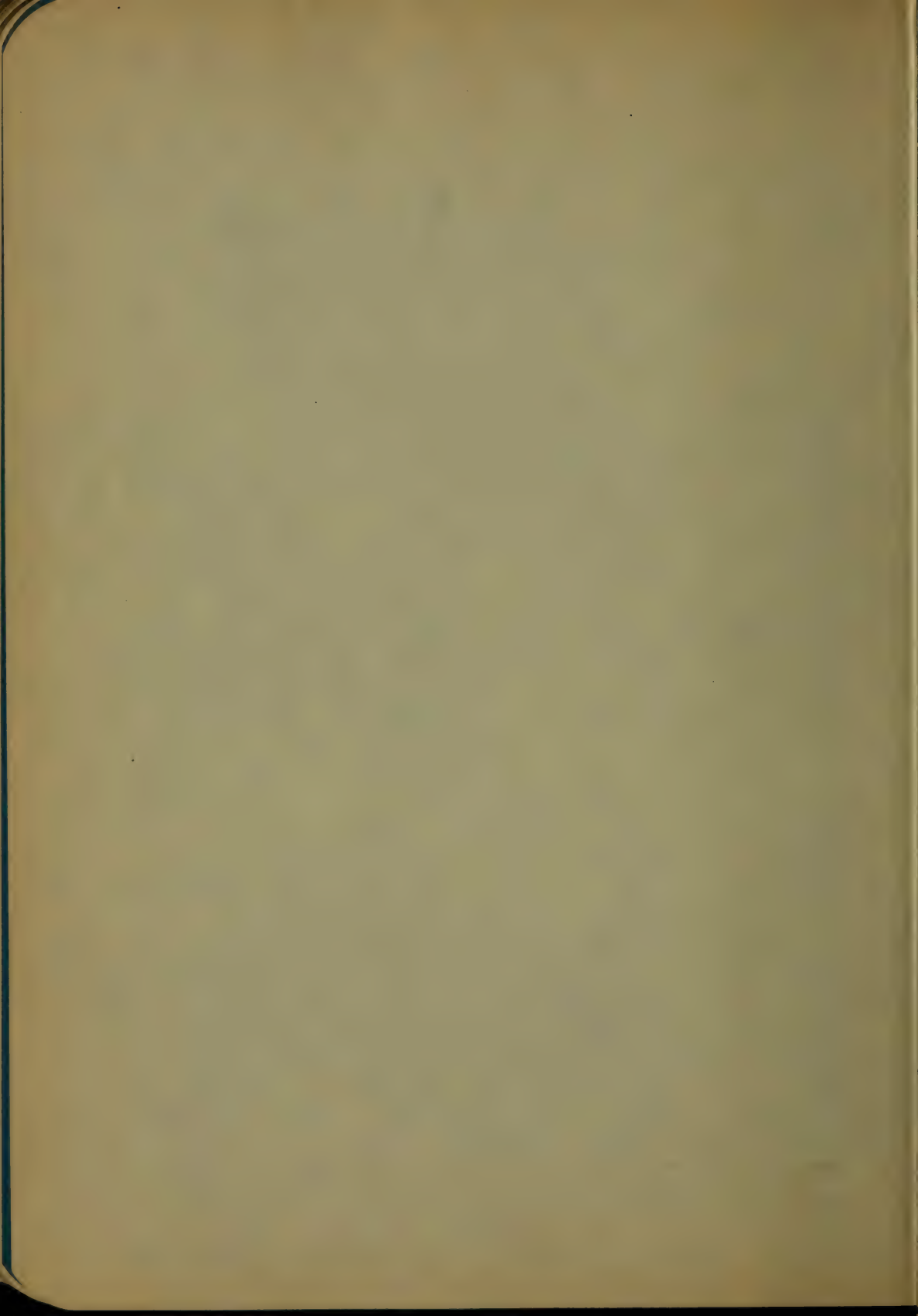
CIRCUMFERENCES OF CIRCLES FROM  
 $\frac{1}{8}$  TO 100.

DIAM.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0	1.0000	.3927	.7854	1.1781	1.5708	1.9635	2.3562	2.7489
1	3.1416	3.5343	3.927	4.3197	4.7124	5.1051	5.4978	5.8905
2	6.2832	6.6759	7.0686	7.4613	7.854	8.2467	8.6394	9.0321
3	9.4248	9.8175	10.2102	10.6029	10.9956	11.3883	11.781	12.1737
4	12.5664	12.9591	13.3518	13.7445	14.1372	14.5299	14.9226	15.3153
5	15.708	16.1007	16.4934	16.8861	17.2788	17.6715	18.0642	18.4569
6	18.8496	19.2423	19.635	20.0277	20.4204	20.8131	21.2058	21.5985
7	21.9912	22.3839	22.776	23.1693	23.562	23.9547	24.347	24.740
8	25.1328	25.5255	25.918	26.3109	26.7036	27.0963	27.489	27.8817
9	28.274	28.667	29.059	29.4525	29.845	30.2379	30.6306	31.023
10	31.416	31.808	32.2014	32.594	32.987	33.379	33.772	34.165
11	34.557	34.950	35.343	35.736	36.1284	36.521	36.9138	37.306
12	37.699	38.092	38.484	38.877	39.270	39.662	40.055	40.448
13	40.841	41.233	41.626	42.018	42.4116	42.8043	43.197	43.589
14	43.982	44.375	44.767	45.160	45.553	45.946	46.338	46.731
15	47.124	47.516	47.909	48.302	48.694	49.087	49.480	49.873
16	50.265	50.658	51.051	51.447	51.836	52.229	52.622	53.014
17	53.407	53.799	54.192	54.585	54.978	55.3707	55.763	56.156
18	56.548	56.941	57.334	57.727	58.119	58.512	58.905	59.297
19	59.690	60.083	60.476	60.868	61.261	61.654	62.046	62.439
20	62.832	63.224	63.617	64.010	64.403	64.795	65.188	65.581
21	65.973	66.366	66.759	67.1517	67.544	67.937	68.329	68.722
22	69.115	69.508	69.900	70.293	70.686	71.078	71.4714	71.864
23	72.256	72.649	73.042	73.435	73.827	74.220	74.613	75.005
24	75.398	75.791	76.1838	76.576	76.969	77.3619	77.754	78.147
25	78.54	78.933	79.325	79.718	80.111	80.503	80.896	81.289
26	81.6816	82.074	82.467	82.859	83.252	83.645	84.037	84.430
27	84.823	85.216	85.608	86.001	86.394	86.786	87.179	87.572
28	87.964	88.357	88.750	89.143	89.535	89.928	90.321	90.713
29	91.106	91.499	91.892	92.284	92.677	93.069	93.462	93.855
30	94.248	94.641	95.033	95.426	95.818	96.211	96.604	96.997
31	97.389	97.782	98.175	98.567	98.960	99.353	99.745	100.138
32	100.531	100.923	101.316	101.709	102.102	102.494	102.887	103.280
33	103.673	104.065	104.458	104.851	105.244	105.636	106.03	106.422
34	106.814	107.207	107.6	107.99	108.385	108.778	109.171	109.56
35	109.956	110.349	110.741	111.134	111.527	111.919	112.312	112.705
36	113.098	113.49	113.883	114.276	114.668	115.061	115.454	115.846
37	116.239	116.632	117.025	117.417	117.81	118.203	118.595	118.988
38	119.381	119.773	120.166	120.559	120.952	121.344	121.737	122.13
39	122.52	122.915	123.308	123.70	124.093	124.486	124.879	125.271
40	125.664	126.057	126.45	126.84	127.235	127.627	128.02	128.413
41	128.806	129.198	129.591	129.984	130.376	130.769	131.162	131.554
42	131.947	132.34	132.733	133.126	133.518	133.911	134.303	134.696
43	135.089	135.481	135.874	136.267	136.66	137.052	137.445	137.838
44	138.23	138.62	139.016	139.408	139.801	140.194	140.587	140.979
45	141.372	141.76	142.157	142.55	142.94	143.335	143.728	144.121
46	144.514	144.906	145.299	145.69	146.084	146.477	146.87	147.262
47	147.655	148.048	148.441	148.833	149.226	149.619	150.011	150.404



DIAM.	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8
48	150.797	151.189	151.582	151.975	152.368	152.76	153.153	153.546
49	153.133	154.331	154.724	155.116	155.509	155.902	156.295	156.687
50	157.08	157.473	157.865	158.258	158.651	159.043	159.436	159.829
51	160.222	160.614	161.007	161.40	161.792	162.185	162.578	162.97
52	163.363	163.756	164.149	164.541	164.934	165.327	165.719	166.112
53	166.505	166.897	167.29	167.68	168.076	168.468	168.861	169.254
54	169.646	170.039	170.43	170.82	171.217	171.61	172.00	172.39
55	172.788	173.181	173.573	173.966	174.359	174.75	175.144	175.537
56	175.93	176.32	176.715	177.108	177.50	177.893	178.286	178.678
57	179.071	179.464	179.857	180.249	180.642	181.035	181.427	181.82
58	182.213	182.605	182.998	183.391	183.784	184.176	184.569	184.962
59	185.354	185.747	186.14	186.53	186.925	187.318	187.711	188.103
60	188.496	188.889	189.281	189.674	190.067	190.459	190.85	191.245
61	191.638	192.03	192.42	192.816	193.208	193.601	193.994	194.386
62	194.779	195.172	195.565	195.957	196.35	196.74	197.135	197.528
63	197.921	198.313	198.706	199.099	199.492	199.884	200.277	200.67
64	201.062	201.455	201.848	202.24	202.63	203.026	203.419	203.811
65	204.204	204.597	204.989	205.382	205.775	206.167	206.56	206.95
66	207.346	207.738	208.131	208.524	208.916	209.309	209.702	210.094
67	210.487	210.88	211.273	211.665	212.058	212.451	212.843	213.236
68	213.629	214.021	214.414	214.807	215.20	215.592	215.985	216.378
69	216.77	217.163	217.556	217.948	218.341	218.734	219.127	219.519
70	219.712	220.305	220.697	221.09	221.483	221.875	222.268	222.661
71	223.05	223.446	223.84	224.23	224.624	225.017	225.41	225.802
72	226.195	226.588	226.981	227.373	227.766	228.159	228.551	228.944
73	229.337	229.739	230.132	230.515	230.908	231.30	231.69	232.086
74	232.478	232.871	233.264	233.656	234.049	234.44	234.835	235.227
75	235.62	236.013	236.406	236.798	237.191	237.583	237.976	238.369
76	238.762	239.154	239.547	239.94	240.33	240.724	241.118	241.51
77	241.903	242.296	242.689	243.081	243.474	243.867	244.26	244.65
78	245.045	245.437	245.83	246.223	246.616	247.008	247.401	247.794
79	248.186	248.579	248.972	249.364	249.757	250.15	250.54	250.935
80	251.328	251.721	252.113	252.506	252.899	253.291	253.684	254.077
81	254.47	254.86	255.255	255.648	256.04	256.43	256.82	257.218
82	257.611	258.004	258.397	258.789	259.182	259.575	259.967	260.36
83	260.753	261.145	261.538	261.931	262.324	262.716	263.109	263.502
84	263.89	264.287	264.68	265.072	265.465	265.858	266.251	266.643
85	267.036	267.429	267.821	268.214	268.607	268.999	269.39	269.785
86	270.178	270.57	270.964	271.356	271.748	272.141	272.53	272.926
87	273.319	273.712	274.105	274.497	274.89	275.283	275.675	276.068
88	276.461	276.853	277.246	277.639	278.032	278.424	278.817	279.21
89	279.602	279.99	280.38	280.78	281.173	281.566	281.959	282.351
90	282.744	283.137	283.529	283.922	284.315	284.707	285.10	285.49
91	285.886	286.278	286.671	287.064	287.456	287.849	288.242	288.634
92	289.027	289.42	289.813	290.205	290.598	290.991	291.383	291.77
93	292.169	292.562	292.95	293.347	293.74	294.132	294.525	294.918
94	295.31	295.703	296.096	296.488	296.881	297.274	297.667	298.059
95	298.45	298.845	299.237	299.63	300.023	300.415	300.808	301.201
96	301.594	301.986	302.379	302.77	303.164	303.557	303.95	304.342
97	304.735	305.128	305.521	305.913	306.306	306.699	307.091	307.484
98	307.877	308.27	308.662	309.055	309.448	309.84	310.233	310.626
99	311.018	311.411	311.804	312.196	312.589	312.982	313.375	313.767
100	314.16							







AREAS OF CIRCLES FROM  $\frac{1}{8}$  TO 100

DIAM. INCH.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0	SQ. INCH	.01227	.04908	.11044	.19638	.30679	.4417	.6013
1	.7854	.9940	1.2272	1.484	1.7671	2.0739	2.4053	2.7612
2	3.1416	3.5466	3.9761	4.4301	4.908	5.4119	5.939	6.492
3	7.068	7.669	8.296	8.946	9.621	10.320	11.044	11.793
4	12.566	13.364	14.186	15.033	15.904	16.800	17.721	18.655
5	19.635	20.629	21.647	22.691	23.758	24.851	25.967	27.108
6	28.274	29.465	30.679	31.919	33.183	34.471	35.783	37.122
7	38.484	39.871	41.282	42.718	44.178	45.663	47.173	48.707
8	50.265	51.848	53.456	55.088	56.745	58.426	60.132	61.862
9	63.617	65.396	67.201	69.029	70.882	72.759	74.662	76.588
10	78.540	80.515	82.516	84.541	86.590	88.664	90.763	92.885
11	95.033	97.205	99.402	101.623	103.869	106.139	108.434	110.754
12	113.098	115.466	117.859	120.277	122.719	125.185	127.677	130.192
13	132.753	135.247	137.887	140.501	143.139	145.802	148.490	151.202
14	153.94	156.70	159.48	162.29	165.130	167.99	170.874	173.784
15	176.715	179.673	182.655	185.661	188.692	191.748	194.828	197.933
16	201.062	204.216	207.395	210.598	213.825	217.077	220.354	223.655
17	226.981	230.331	233.706	237.105	240.53	243.97	247.45	250.95
18	254.47	258.016	261.58	265.183	268.803	272.45	276.117	279.811
19	283.53	287.27	291.04	294.83	298.65	302.49	306.35	310.24
20	314.160	318.09	322.06	326.05	330.06	334.102	338.16	342.25
21	346.36	350.497	354.65	358.84	363.05	367.28	371.54	375.82
22	380.134	384.46	388.82	393.20	397.61	402.04	406.50	410.97
23	415.48	420.00	424.56	429.13	433.74	438.36	443.01	447.7
24	452.39	457.115	461.86	466.64	471.43	476.26	481.107	485.98
25	490.87	495.79	500.74	505.71	510.71	515.72	520.77	525.84
26	530.93	536.02	541.19	546.36	551.55	556.76	562.00	567.27
27	572.56	577.87	583.21	588.57	593.96	599.37	604.81	610.27
28	615.75	621.26	626.79	632.37	637.94	643.55	649.34	654.84
29	660.52	666.23	671.96	677.71	683.49	689.29	695.128	700.98
30	706.86	712.76	718.69	724.64	730.62	736.62	742.65	748.69
31	754.77	760.87	766.99	773.14	779.31	785.51	791.73	797.98
32	804.25	810.55	816.86	823.21	829.58	835.97	842.39	848.83
33	855.30	861.79	868.31	874.85	881.42	888.005	894.62	901.26
34	907.92	914.61	921.32	928.06	934.82	941.61	948.4	955.26
35	962.115	969.0	975.61	982.84	989.8	996.78	1003.79	1010.82
36	1017.88	1024.96	1032.07	1039.19	1046.35	1053.53	1060.73	1067.96
37	1075.21	1082.49	1089.79	1097.12	1104.47	1111.84	1119.24	1126.67
38	1134.12	1141.59	1149.09	1156.61	1164.16	1171.73	1179.33	1186.95
39	1194.6	1202.26	1209.96	1217.67	1225.42	1233.19	1240.98	1248.79
40	1256.4	1264.51	1272.4	1280.3	1288.25	1296.22	1304.2	1312.22
41	1320.26	1328.32	1336.4	1344.5	1352.64	1360.82	1369.0	1377.2
42	1385.45	1393.7	1401.99	1410.3	1418.63	1426.99	1435.37	1443.77
43	1452.2	1460.66	1469.14	1477.64	1486.17	1494.73	1503.3	1511.91
44	1520.53	1529.2	1537.86	1546.56	1555.29	1564.04	1572.8	1581.61
45	1590.4	1599.3	1608.16	1617.05	1625.97	1634.92	1643.89	1652.89
46	1661.91	1670.95	1680.02	1689.11	1698.23	1707.37	1716.54	1725.73
47	1734.98	1744.19	1753.45	1762.74	1772.06	1781.4	1790.76	1800.15
48	1809.56	1819.0	1828.46	1837.95	1847.46	1856.99	1866.55	1876.14



## AREAS OF CIRCLES

DIAM.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
49	1885.75	1895.38	1905.04	1914.72	1924.43	1934.16	1943.91	1953.7
50	1963.5	1973.33	1983.18	1993.06	2002.97	2012.89	2022.86	2032.82
51	2042.83	2052.65	2062.4	2072.18	2083.01	2093.2	2103.35	2113.52
52	2123.72	2133.94	2144.19	2154.46	2164.76	2175.08	2185.42	2195.79
53	2206.19	2216.61	2227.05	2237.52	2248.01	2258.53	2269.07	2279.64
54	2290.23	2300.8	2311.48	2322.18	2332.83	2343.55	2354.3	2365.05
55	2375.8	2386.63	2397.48	2408.34	2419.23	2430.14	2441.07	2452.03
56	2463.01	2474.02	2485.05	2496.11	2507.19	2518.3	2529.43	2540.58
57	2557.76	2562.97	2574.3	2585.45	2596.73	2608.03	2619.36	2630.71
58	2672.99	2653.5	2664.91	2676.36	2687.84	2699.33	2710.86	2722.41
59	2733.18	2745.57	2757.2	2768.8	2780.51	2792.21	2803.93	2815.67
60	2827.44	2839.23	2851.05	2862.89	2874.76	2886.65	2898.57	2910.51
61	2922.47	2934.46	2946.48	2958.52	2970.58	2982.67	2994.78	3006.92
62	3019.08	3031.26	3043.47	3055.71	3067.97	3080.25	3092.56	3104.89
63	3117.25	3129.64	3142.04	3154.47	3166.93	3179.41	3191.91	3204.44
64	3217.0	3229.58	3242.18	3254.81	3267.46	3280.14	3292.84	3305.56
65	3318.31	3331.09	3343.89	3356.71	3369.56	3382.44	3395.33	3408.26
66	3421.2	3434.17	3447.17	3460.19	3473.24	3486.3	3499.4	3512.52
67	3525.66	3538.83	3552.02	3565.24	3578.48	3591.74	3605.04	3618.35
68	3631.69	3645.05	3658.44	3671.86	3685.29	3698.76	3712.24	3725.75
69	3739.39	3752.85	3766.43	3780.04	3793.7	3807.34	3821.02	3834.73
70	3848.14	3862.22	3876.0	3889.8	3903.6	3917.5	3931.37	3945.27
71	3959.8	3973.15	3987.13	4001.13	4015.16	4029.21	4043.3	4057.4
72	4071.31	4085.66	4099.84	4114.04	4128.26	4142.51	4156.7	4171.08
73	4185.4	4199.74	4214.11	4228.5	4242.9	4257.3	4271.8	4286.3
74	4300.85	4315.3	4329.9	4344.6	4359.17	4373.8	4388.49	4403.16
75	4417.87	4432.61	4447.3	4462.1	4476.9	4491.8	4506.6	4521.56
76	4536.47	4551.41	4566.3	4581.35	4596.36	4611.39	4626.45	4641.53
77	4666.64	4671.77	4686.92	4702.1	4717.31	4732.5	4747.8	4763.07
78	4778.37	4793.7	4809.05	4824.4	4839.8	4855.2	4870.71	4886.18
79	4901.68	4917.21	4932.78	4948.33	4963.9	4979.5	4995.2	5010.8
80	5026.56	5042.28	5058.03	5073.79	5089.59	5105.41	5121.25	5137.12
81	5153.01	5168.93	5184.87	5200.83	5216.83	5232.84	5248.88	5264.94
82	5281.03	5297.14	5313.28	5329.44	5345.63	5361.84	5378.08	5394.34
83	5410.62	5426.93	5443.26	5459.63	5476.01	5492.41	5508.84	5525.3
84	5541.78	5558.29	5574.82	5591.37	5607.95	5624.56	5641.18	5657.84
85	5674.57	5691.22	5707.94	5724.69	5741.47	5758.27	5775.1	5791.94
86	5808.82	5825.72	5842.61	5859.59	5876.56	5893.53	5910.58	5927.62
87	5944.49	5961.79	5978.91	5996.05	6013.22	6030.41	6047.63	6064.87
88	6082.14	6099.43	6116.74	6134.08	6151.45	6168.84	6186.25	6203.69
89	6221.15	6238.64	6256.15	6273.69	6291.25	6308.84	6326.45	6344.08
90	6361.74	6379.42	6397.13	6414.86	6432.62	6450.4	6468.21	6486.04
91	6503.9	6521.78	6539.68	6557.61	6575.56	6593.54	6611.55	6629.57
92	6647.63	6665.7	6683.8	6701.93	6720.08	6738.25	6756.45	6774.68
93	6792.92	6811.2	6829.49	6847.83	6866.16	6884.53	6902.93	6921.35
94	6939.79	6958.26	6976.76	6995.28	7013.82	7032.39	7050.98	7069.59
95	7088.24	7106.9	7125.59	7144.31	7163.04	7181.81	7200.6	7219.41
96	7238.25	7257.11	7275.99	7294.91	7313.84	7332.8	7351.79	7370.79
97	7389.83	7408.89	7427.97	7447.08	7466.21	7485.37	7504.53	7523.75
98	7542.98	7562.24	7581.52	7600.82	7620.15	7639.5	7658.88	7678.28
99	7697.71	7717.16	7736.63	7756.13	7775.66	7795.21	7814.78	7834.38
100	7854.							







# U.S. GALLONS IN GIVEN NUMBER OF CUB. FEET.

CUB. FEET.	GALLONS.	CUB. FEET.	GALLONS.	CUB. FEET.	GALLONS.	CUB. FEET.	U.S. GALLONS.
1	.75	20	149.6	500	5984.4	90000	673246.7
2	1.50	30	224.4	900	6732.4	100000	748052.9
3	2.25	40	299.2	1000	7480.0	200000	1496103.8
4	2.99	50	374.0	2000	14961.0	300000	2244156.1
5	3.74	60	448.8	3000	22441.0	400000	2992207.6
6	4.49	70	523.6	4000	29922.5	500000	3740259.5
7	5.24	80	598.4	5000	37402.0	600000	4488311.4
8	5.98	90	673.2	6000	44883.1	700000	5236363.3
9	6.73	100	748.0	7000	52363.0	800000	5984415.2
1	7.48	150	1122.0	8000	59844.1	900000	6732467.7
2	14.9	200	1496.1	9000	67324.6	1000000	7480519.0
3	22.4	250	1870.1	10000	74805.6		
4	29.9	300	2244.1	20000	149610.4	5000000	374259500
5	37.4	350	2618.1	30000	224415.6		
6	44.9	400	2992.2	40000	299220.7	10000000	748051900
7	52.4	450	3366.2	50000	374025.9		
8	59.8	500	3740.2	60000	448831.1	50000000	374259500
9	67.3	600	4488.3	70000	523639.3		
10	74.8	700	5236.3	80000	598441.5	100,000,000	748051900

## CONTENTS OF ROUND TANKS IN U.S. GALLONS FOR EACH FOOT IN DEPTH.

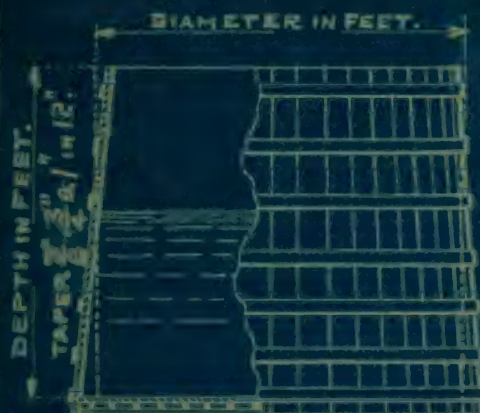
DIAM. FT. IN.	GALLONS ONE FOOT IN DEPTH.	DIAM. FT. IN.	GALLONS ONE FOOT IN DEPTH.	DIAM. FT. IN.	GALLONS ONE FOOT IN DEPTH.	DIAM. FT. IN.	GALLONS ONE FOOT IN DEPTH.
1'-0"	5.874	7'-0"	287.803	13'-0"	992.627	19'-0"	3120.797
1'-3"	9.177	7'-3"	308.727	13'-3"	1031.172	19'-3"	2176.980
1'-6"	13.215	7'-6"	330.386	13'-6"	1070.451	19'-6"	2223.887
1'-9"	17.987	7'-9"	352.766	13'-9"	1108.065	19'-9"	2291.535
2'-0"	23.494	8'-0"	375.906	14'-0"	1151.213	20'-0"	2349.917
2'-3"	29.734	8'-3"	399.766	14'-3"	1192.694	20'-3"	2409.031
2'-6"	36.709	8'-6"	424.363	14'-6"	1234.910	20'-6"	2529.466
2'-9"	44.418	8'-9"	449.212	14'-9"	1277.862	20'-9"	2578.878
3'-0"	52.862	9'-0"	475.853	14'-9"	1277.862	21'-0"	2590.230
3'-3"	62.038	9'-3"	502.662	15'-0"	1321.545	21'-3"	2652.253
3'-6"	73.130	9'-6"	529.201	15'-3"	1365.963	21'-6"	2715.041
3'-9"	82.596	9'-9"	558.233	15'-6"	1407.517	21'-9"	2778.548
4'-0"	93.975	10'-0"	577.479	15'-9"	1457.003	22'-0"	2842.791
4'-3"	103.030	10'-3"	607.470	16'-0"	1503.625	22'-3"	2907.766
4'-6"	118.940	10'-6"	638.715	16'-3"	1550.980	22'-6"	2973.489
4'-9"	132.621	10'-9"	670.903	16'-6"	1599.070	22'-9"	3039.921
5'-0"	146.838	11'-0"	710.698	16'-9"	1647.893	23'-0"	3107.012
5'-3"	161.888	11'-3"	743.369	17'-0"	1697.452	23'-3"	3243.660
5'-6"	177.674	11'-6"	776.775	17'-3"	1747.743	23'-6"	3313.040
5'-9"	194.191	11'-9"	810.914	17'-6"	1798.770	23'-9"	3383.156
6'-0"	211.447	12'-0"	848.169	17'-9"	1850.530	24'-0"	3454.005
6'-3"	229.434	12'-3"	881.397	18'-0"	1903.025	24'-3"	3525.593
6'-6"	248.156	12'-6"	917.739	18'-3"	1956.254	24'-6"	3597.907
6'-9"	267.612	12'-9"	954.816	18'-6"	2010.217	24'-9"	3670.960
				18'-9"	2064.914	25'-0"	3670.960

ONE BARREL = 31½ GAL'S. ONE PETROLEUM BARREL = 42 GAL'S.



# WOODEN TANKS,

## CAPACITY IN BARRELS OF 31½ GALLONS.



TANKS ARE MADE OF PINE OR CYPRESS WOOD.

USE 2"x4" STAVES UP TO 150 BBS.

2"x6" " " " 250 "

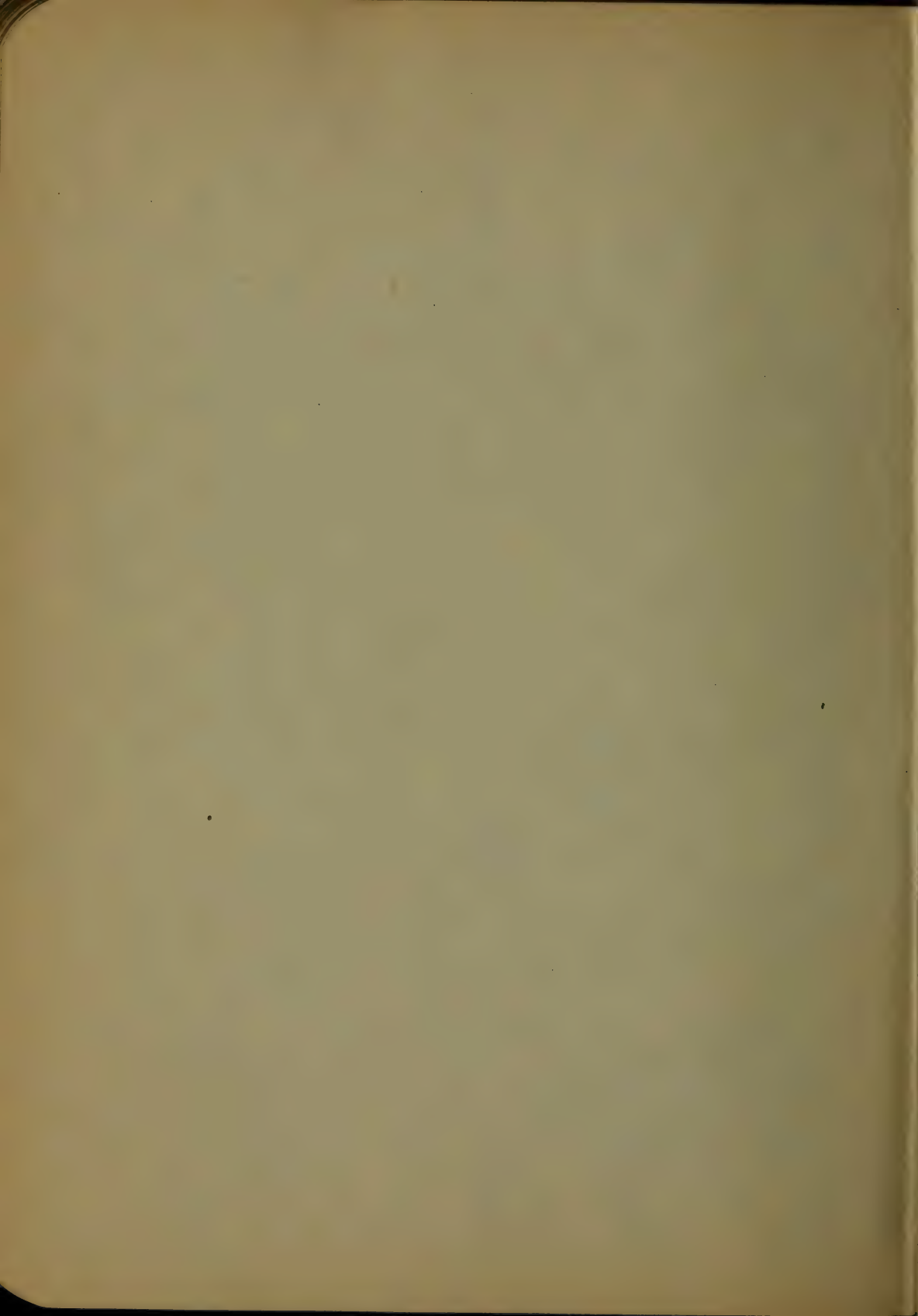
3"x6" " " OVER 250 "

2" TO 2½" LUMBER FOR TANK BOTTOM.

BAND IRON { 1½" TO 4" 4½" TO 6" 7" TO 8" WIDE.  
B.G. N° 10, 11, 12, 13, 14. THICK.  
N° 9 TO 3/16" N° 9 TO ¼" N° 9 TO 5/16"

DEPTH FEET.	DIAMETER IN FEET.							
	5	6	7	8	9	10	11	12
5	23.3	33.6	45.7	59.7	75.5	93.2	112.8	134.3
6	28.0	40.3	54.8	71.7	90.6	111.0	135.4	161.1
7	32.7	47.0	64.0	83.6	105.7	130.6	158.0	188.0
8	37.3	53.7	73.1	95.5	120.9	149.1	180.5	214.8
9	42.0	60.4	82.2	107.4	136.0	167.9	203.1	241.7
10	46.7	67.1	91.4	119.4	151.1	186.5	225.7	268.4
11	51.3	73.9	100.5	131.3	166.2	205.1	248.2	295.4
12	56.0	80.6	109.8	143.2	181.3	223.8	270.8	322.8
13	60.7	87.3	118.8	155.2	196.4	242.4	293.4	349.1
14	65.3	94.0	127.9	167.1	211.5	261.1	315.9	376.0
15	70.0	100.7	137.1	179.0	226.3	289.9	338.5	408.8
16	74.7	107.4	146.2	191.0	241.7	298.4	361.1	429.7
17	79.3	114.1	155.4	202.9	256.8	317.0	383.6	456.6
18	84.0	120.9	164.5	214.8	272.0	335.7	406.2	483.4
19	88.7	127.6	173.6	226.8	287.0	354.3	428.8	510.3
20	93.3	134.3	182.8	238.7	302.1	373.0	451.3	537.1

DEPTH FEET.	DIAMETER IN FEET.							
	13	14	15	16	17	18	19	20
5	157.6	182.8	209.8	238.7	269.5	302.1	336.6	373.0
6	189.1	219.3	251.8	286.5	323.4	362.6	404.0	447.6
7	220.6	255.9	293.7	334.2	377.3	423.0	471.3	522.2
8	251.1	292.4	335.7	382.0	431.2	483.4	538.6	596.8
9	283.7	329.0	377.7	429.7	485.1	543.8	605.9	671.4
10	315.2	365.5	419.6	477.4	539.0	604.3	673.3	746.4
11	346.7	402.1	461.6	525.2	592.9	667.7	740.6	820.6
12	378.2	438.6	503.5	572.0	646.8	725.1	807.9	895.2
13	409.7	475.2	545.5	620.7	700.7	785.5	875.2	969.8
14	441.3	511.0	587.5	668.2	754.6	846.0	942.6	1044.4
15	472.3	548.3	629.4	716.2	808.5	906.4	1009.9	1119.0
16	504.3	584.9	671.4	773.9	862.4	966.8	1077.2	1193.6
17	535.8	621.4	713.4	811.6	916.3	1027.2	1144.6	1268.2
18	567.3	658.0	753.3	859.4	970.2	1087.7	1211.9	1342.8
19	598.0	694.5	797.3	907.1	1024.1	1148.1	1279.2	1417.4
20	634.4	731.1	839.3	954.9	1078.0	1208.5	1346.5	1492.0







# METRIC SYSTEM.

A.                      B.                      C.  
LENGTH, CAPACITY AND WEIGHT.

A	KILOMETER	HECTOMET.	DEKAMET.	METER	DECIMET.	CENTIMET.	MILLIMET.
B	KILOLITRE	HECTOLIT.	DEKALIT.	LITRE	DECILIT.	CENTILIT.	MILLILIT.
C	KILOGRAM- ME	HECTOGR.	DEKAGR.	GRAMME	DECIGR.	CENTIGR.	MILLIGR.
	1	10	100	1000	10000	100000	1000000
		1	10	100	1000	10000	100000
			1	10	100	1000	10000
				1	10	100	1000
				.1	1	10	100
				.01	.1	1	10
				.001	.01	.1	1

DECIMAL PARTS OF:

ONE MYRIAMETER = 10 KILOMETERS = 10000 METERS.

ONE TONNE = 1000 KILOGRAMMES = 100 QUINTALS =  
= 10 MYRIAGRAMMES.

## SURFACE MEASURE.

SQUARE KILOMETER	SQU. HECTOMETER OR HECTARE	SQU. DEKAMETER OR ARE	SQU. METER OR CENTIARE	SQU. DECIMETER	SQU. CENTIMETER	SQU. MILLIMETER
1	100	10000	1000000	1000000		
	1	100	10000	100000		
	.01	1	100	10000	1000000	
	.0001	.01	1	100	10000	1000000
DECIMAL PARTS OF	.000001	.0001	.01	1	100	1000000
		.000001	.0001	.01	1	100
			.000001	.0001	.01	1

ONE SQU. MYRIAMETER = 100 SQU. KILOMETER = 100000000 SQU. METERS

## CUBIC MEASURE.

CUB. DEKAMETER'S	CUB. METER	CUB. DECIMETER	CUB. CENTIMETER	CUB. MILLIMETER
1	1000	1000000	1000000000	
.001	1	1000	1000000	10000000000
.000001	.001	1	1000	1000000
.000000001	.000001	.001	1	1000
	.000000001	.000001	.001	1

ONE CUB. DECIMETER = 1 LITRE. ONE CUB. METER = 1000 LITRES.

ONE CUB. CENTIMETER OF DIST. WATER AT 32° F. AND 29<sup>15</sup>/<sub>32</sub> INCHES BAROMETER =  
ONE GRAM.



# CONVERTING U.S. INCHES TO METRIC-MILLIMETERS.

ONE INCH = 25.400 M.M. FROM 1/16" TO 30" ADVANCING BY 1/16" - ONE FOOT = 304.8 M.M.  
 ONE FOOT = 304.80 M.M. ONE METER = 3.2808 FEET. ONE YARD = 914.4 M.M.

INCH	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
MILLIMETER	0	25.4	50.8	76.2	101.6	127.0	152.4	177.8	203.2	228.6	254.0	279.4	304.8	330.2	355.6	381.0	406.4	431.8	457.2	482.6	508.0	533.4	558.8	584.2	609.6	635.0	660.4	685.8	711.2	736.6	762.0	787.4	812.8	838.2	863.6	889.0
1/16	1.6	2.0	2.5	3.2	4.0	5.0	6.3	7.9	9.8	12.2	15.2	18.8	23.2	28.3	34.3	41.3	49.3	58.3	68.3	79.3	91.3	104.3	118.3	133.3	149.3	166.3	184.3	203.3	223.3	244.3	266.3	289.3	313.3	338.3	364.3	391.3
1/8	3.2	4.0	5.0	6.3	7.9	10.0	12.5	15.6	19.5	24.4	29.5	35.0	41.3	48.3	56.0	64.5	73.8	83.9	94.8	106.5	119.0	132.3	146.4	161.3	177.0	193.5	210.8	228.9	247.8	267.6	288.2	309.6	331.8	354.8	378.6	403.2
3/16	4.8	6.0	7.5	9.4	11.6	14.3	17.5	21.2	25.5	30.5	36.2	42.7	50.0	58.1	67.1	77.0	87.8	99.6	112.3	126.0	140.6	156.2	172.8	190.4	209.0	228.6	249.2	270.8	293.4	317.0	341.6	367.2	393.8	421.4	450.0	479.6
1/4	6.3	7.9	10.0	12.5	15.6	19.5	24.4	29.5	35.0	41.3	48.3	56.0	64.5	73.8	83.9	94.8	106.5	119.0	132.3	146.4	161.3	177.0	193.5	210.8	228.9	247.8	267.6	288.2	309.6	331.8	354.8	378.6	403.2	428.6	454.8	481.8
5/16	7.9	10.0	12.5	15.6	19.5	24.4	29.5	35.0	41.3	48.3	56.0	64.5	73.8	83.9	94.8	106.5	119.0	132.3	146.4	161.3	177.0	193.5	210.8	228.9	247.8	267.6	288.2	309.6	331.8	354.8	378.6	403.2	428.6	454.8	481.8	509.6
3/8	9.5	12.0	15.0	18.8	23.2	28.3	34.3	41.3	49.3	58.3	68.3	79.3	91.3	104.3	118.3	133.3	149.3	166.3	184.3	203.3	223.3	244.3	266.3	289.3	313.3	338.3	364.3	391.3	419.3	448.3	478.3	509.3	541.3	574.3	608.3	
7/16	11.2	14.2	17.5	21.2	25.5	30.5	36.2	42.7	50.0	58.1	67.1	77.0	87.8	99.6	112.3	126.0	140.6	156.2	172.8	190.4	209.0	228.6	249.2	270.8	293.4	317.0	341.6	367.2	393.8	421.4	450.0	479.6	509.6	540.2	571.2	
1/2	12.7	16.0	20.0	24.4	29.5	35.0	41.3	48.3	56.0	64.5	73.8	83.9	94.8	106.5	119.0	132.3	146.4	161.3	177.0	193.5	210.8	228.9	247.8	267.6	288.2	309.6	331.8	354.8	378.6	403.2	428.6	454.8	481.8	509.6	538.2	
9/16	14.3	18.2	22.5	27.1	32.0	37.7	44.0	51.2	59.5	68.8	79.0	90.0	101.8	114.5	128.0	142.3	157.4	173.3	190.0	207.5	225.8	244.9	264.8	285.6	307.2	329.6	352.8	376.8	401.6	427.2	453.6	480.8	508.8	537.6	567.2	
5/8	15.9	20.0	24.4	29.5	35.0	41.3	48.3	56.0	64.5	73.8	83.9	94.8	106.5	119.0	132.3	146.4	161.3	177.0	193.5	210.8	228.9	247.8	267.6	288.2	309.6	331.8	354.8	378.6	403.2	428.6	454.8	481.8	509.6	538.2	567.8	
11/16	17.5	22.0	26.5	32.0	37.7	44.0	51.2	59.5	68.8	79.0	90.0	101.8	114.5	128.0	142.3	157.4	173.3	190.0	207.5	225.8	244.9	264.8	285.6	307.2	329.6	352.8	376.8	401.6	427.2	453.6	480.8	508.8	537.6	567.2	597.6	
3/4	19.0	24.0	29.0	35.0	41.3	48.3	56.0	64.5	73.8	83.9	94.8	106.5	119.0	132.3	146.4	161.3	177.0	193.5	210.8	228.9	247.8	267.6	288.2	309.6	331.8	354.8	378.6	403.2	428.6	454.8	481.8	509.6	538.2	567.8	598.2	
13/16	20.6	26.0	31.0	37.0	43.0	50.0	58.0	67.0	77.0	87.0	98.0	109.0	120.0	132.0	144.0	157.0	170.0	184.0	198.0	213.0	228.0	243.0	259.0	275.0	292.0	309.0	327.0	345.0	364.0	383.0	403.0	423.0	443.0	464.0		
7/8	22.3	28.0	33.0	39.0	45.0	52.0	60.0	69.0	79.0	89.0	100.0	111.0	122.0	134.0	146.0	159.0	172.0	186.0	200.0	215.0	230.0	245.0	261.0	277.0	294.0	311.0	328.0	346.0	364.0	383.0	403.0	423.0	443.0	464.0	485.0	
15/16	24.1	30.0	35.0	41.0	47.0	54.0	62.0	71.0	81.0	91.0	102.0	113.0	124.0	136.0	148.0	161.0	174.0	188.0	202.0	217.0	232.0	247.0	263.0	279.0	296.0	313.0	330.0	348.0	366.0	385.0	405.0	425.0	445.0	466.0		
1	25.4	31.5	37.5	43.5	50.0	57.0	65.0	74.0	84.0	94.0	105.0	116.0	127.0	139.0	151.0	164.0	177.0	191.0	205.0	220.0	235.0	250.0	266.0	282.0	299.0	316.0	333.0	351.0	369.0	388.0	407.0	427.0	447.0	467.0		







# COMPARATIVE EQUIVALENTS OF U.S. WEIGHTS & MEASURES AND METRIC SYSTEM.

COSTUMARY TO METRIC. — METRIC TO COSTUMARY.  
↓ LINEAR MEASURE. ↓

NUMBER.	64 <sup>th</sup> OF AN INCH TO MILLIMETERS.	INCHES TO CENTIMETERS.	FEET TO METERS.	YARDS TO METERS.	STATUTE MILES TO KILOMETERS.	NAUTICAL MILES TO KILOMETERS.	MILLIMETERS TO 64 <sup>th</sup> OF AN INCH.	CENTIMETERS TO INCHES.	METERS TO FEET.	METERS TO YARDS.	KILOMETERS TO STATUTE MILES.	KILOMETERS TO NAUTICAL MILES.	NUMBER.
1	.894	2.540	.3048	.9144	1.609	1.852	2.540	.394	3.281	1.0936	.6214	.5396	1
2	.795	5.080	.6096	1.8288	3.218	3.704	5.080	.787	6.562	2.1872	1.2427	1.0792	2
3	1.101	7.620	.9144	2.7432	4.828	5.499	7.620	1.181	9.843	3.2808	1.7541	1.5188	3
4	1.587	10.160	1.2192	3.6576	6.407	7.343	10.160	1.574	13.123	4.3744	2.4556	2.1244	4
5	1.924	12.700	1.5240	4.5720	8.046	9.266	12.700	1.968	16.404	5.421	3.1068	2.6936	5
6	2.381	15.240	1.8288	5.4864	9.456	10.915	15.240	2.362	19.485	6.5616	3.7227	3.2376	6
7	2.779	17.780	2.1336	6.4008	11.265	12.972	17.780	2.756	22.540	7.6224	4.3496	3.7702	7
8	3.175	20.320	2.4384	7.3152	12.875	14.928	20.320	3.149	25.540	8.748	4.9707	4.3167	8
9	3.572	22.860	2.7432	8.2302	14.908	16.979	22.860	3.543	28.525	9.8424	5.5923	4.8543	9
10	3.968	25.400	3.0480	9.1440	16.093	18.523	25.400	3.936	31.543	10.936	6.2137	5.3957	10

1 NAUTICAL MILE = 1853.25 METERS. 1 GUNTER CHAIN = 20.1168 METERS.  
ONE FATHOM = 1.829 METERS.

## ↓ CAPACITY MEASURE. ↓

NUMBER.	LIQUID QUARTS TO LITRES.	GALLONS TO LITRES.	GALLONS TO CUB. METERS.	BUSHEL TO HECTOLITRES.	FLUID DRAUGHTS TO CUB. CENTIMETERS.	FLUID OUNCES TO CUB. CENTIMETERS.	LITRES TO LIQUID QUARTS.	LITRES TO GALLONS.	CUB. METERS TO GALLONS.	HECTOLITRES TO BUSHEL.	DECACENTIMETERS TO FLUID DRAUGHTS.	HECTOLITRES TO FLUID OUNCES.	NUMBER.
1	.946	3.785	.0038	.3524	3.697	29.574	1.057	.264	264.17	2.837	.277	.2632	1
2	1.893	7.571	.0076	.7048	7.393	59.147	2.113	.528	528.34	5.675	.554	.5265	2
3	2.839	11.356	.0114	1.0572	11.090	88.721	3.170	.793	792.51	8.513	.832	.8048	3
4	3.785	15.142	.0152	1.4095	14.787	118.295	4.227	1.057	1056.68	11.356	1.112	1.0733	4
5	4.732	18.927	.0189	1.762	18.484	147.868	5.283	1.321	1320.85	14.189	1.383	1.3291	5
6	5.678	22.713	.0227	2.1144	22.180	177.442	6.340	1.585	1584.02	16.984	1.653	1.6099	6
7	6.625	26.498	.0265	2.4667	25.877	207.016	7.397	1.849	1848.19	19.796	1.934	1.8867	7
8	7.572	30.283	.0303	2.8191	29.574	236.59	8.453	2.113	2112.36	22.592	2.194	2.1475	8
9	8.517	34.069	.0341	3.1715	33.270	266.16	9.510	2.378	2372.53	25.34	2.447	2.3997	9
10	9.464	37.854	.0379	3.5239	36.967	295.74	10.566	2.642	2641.7	28.377	2.795	2.7481	10



# WEIGHTS.

CUSTOMARY TO METRIC.

METRIC TO CUSTOMARY.

NUMBER	GRAINS TO MILLIGRAMS	TRAYOUNCES TO GRAMMES	AVOIR. DWT. TO GRAMMES	AVOIR. POUNDS TO KILOGRAMS	NET TONS TO METRIC TONNES	GROSS TONS TO METRIC TONNES	MILLIGRAMS TO GRAMMES	GRAMMES TO TRAYOUNCES	GRAMMES TO AVOIR. OUNCES	KILOGRAMMES TO AVOIR. POUNDS	METRIC TONNES TO NET TONS	METRIC TONNES TO GROSS TONS	NET TONS
1	15.432	31.103	3.743	1.814	1.016	1.016	1000	0.035	0.0013	2.204	1.102	1.102	1
2	30.864	62.206	7.486	3.628	2.032	2.032	2000	0.070	0.0026	4.408	2.204	2.204	2
3	46.296	93.309	11.229	5.442	3.048	3.048	3000	0.105	0.0039	6.612	3.306	3.306	3
4	61.728	124.412	14.972	7.256	4.064	4.064	4000	0.140	0.0052	8.816	4.408	4.408	4
5	77.160	155.515	18.715	9.070	5.080	5.080	5000	0.175	0.0065	11.020	5.512	5.512	5
6	92.592	186.618	22.458	10.884	6.096	6.096	6000	0.210	0.0078	13.224	6.616	6.616	6
7	108.024	217.721	26.201	12.698	7.112	7.112	7000	0.245	0.0091	15.428	7.720	7.720	7
8	123.456	248.824	29.944	14.512	8.128	8.128	8000	0.280	0.0104	17.632	8.824	8.824	8
9	138.888	279.927	33.687	16.326	9.144	9.144	9000	0.315	0.0117	19.836	9.928	9.928	9
10	154.320	311.030	37.430	18.140	10.160	10.160	10000	0.350	0.0130	22.040	11.032	11.032	10

1 AVOIR. DWT. = 1.55517 Grams. 1 KILOGRAMME = 1543.2364 Grains.

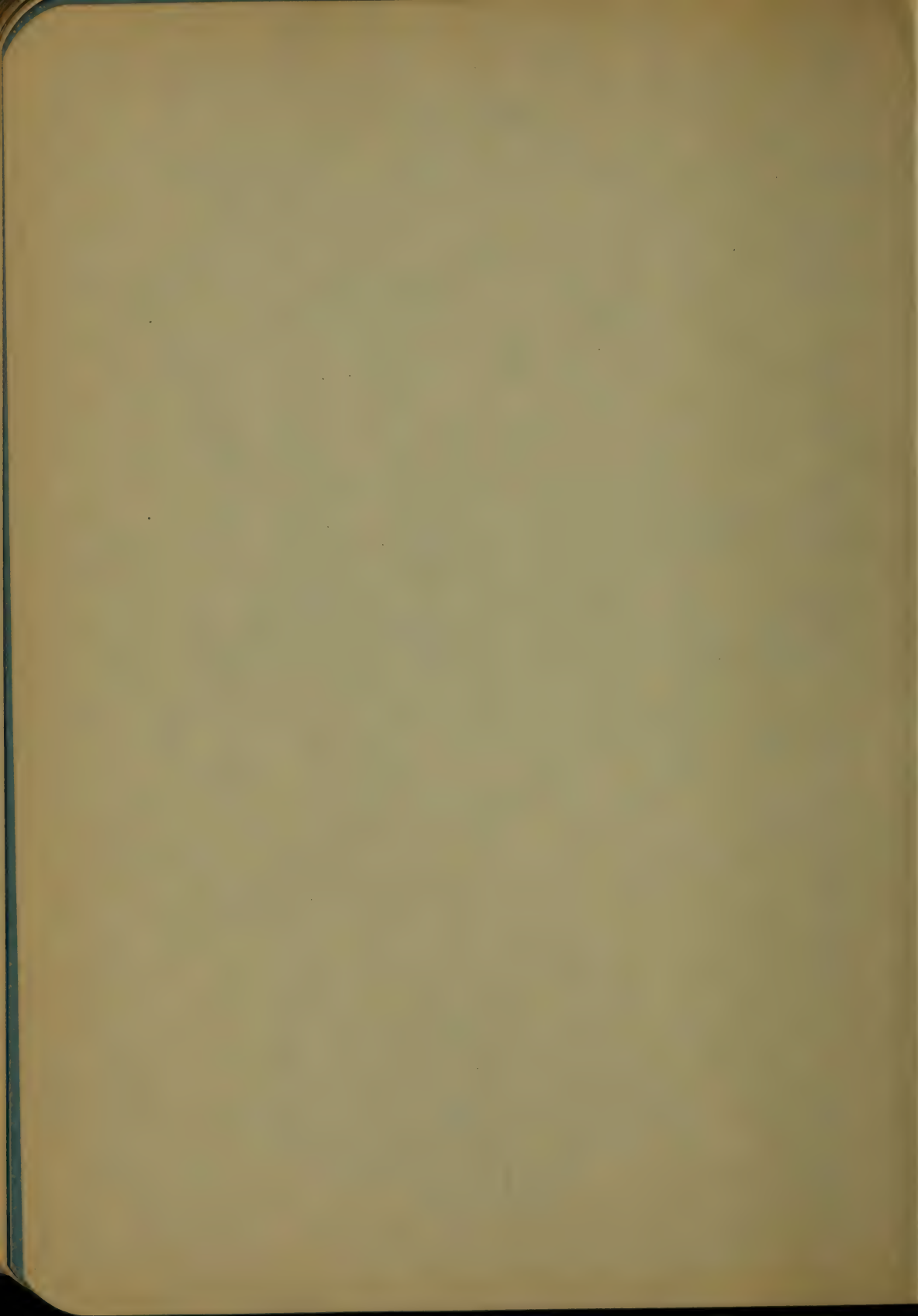
## CONVERTING AVOIR. POUNDS TO MET. KILOGRAMS. 1 TO 110 LBS.

POUNDS	1	2	3	4	5	6	7	8	9	10
1	0.453	0.907	1.360	1.814	2.267	2.720	3.173	3.626	4.079	4.532
2	0.907	1.814	2.720	3.626	4.532	5.438	6.344	7.250	8.156	9.062
3	1.360	2.720	4.079	5.438	6.797	8.156	9.515	10.874	12.233	13.592
4	1.814	3.626	5.438	7.250	9.062	10.874	12.686	14.498	16.310	18.122
5	2.267	4.532	6.797	9.062	11.327	13.592	15.857	18.122	20.387	22.652
6	2.720	5.438	8.156	10.874	13.592	16.310	18.950	21.635	24.343	27.009
7	3.173	6.344	9.515	12.686	15.857	18.950	22.103	24.892	27.899	30.466
8	3.626	7.250	10.874	14.498	18.122	21.635	25.000	27.440	30.466	33.023
9	4.079	8.156	12.233	16.310	20.387	24.343	27.899	30.466	33.023	35.580
10	4.532	9.062	13.592	18.122	22.652	27.009	30.466	33.023	35.580	38.137

FROM TABLE: 72 LBS. = 32.688 KLG.  
107 LBS. = 48.578 KLG.

## CUBIC MEASURE.

NUMBER	CUB. INCHES TO CUB. CENTIMETERS	CUB. INCHES TO CUB. DECI METERS	CUB. FEET TO CUB. METERS	CUB. YARDS TO CUB. METERS	CENTIMETERS TO CUB. INCHES	CUB. DECI METERS TO CUB. INCHES	CUB. METERS TO CUB. FEET	CUB. METERS TO CUB. YARDS	NUMBER
1	16.3872	0.0683	0.0283	0.7645	0.6732	61.0237	35.2335	1.3579	1
2	32.7744	0.1366	0.0566	1.5290	1.3464	122.0474	70.4670	2.7158	2
3	49.1616	0.2049	0.0849	2.2935	1.9696	183.0711	105.7005	4.0737	3
4	65.5488	0.2732	0.1132	3.0580	2.5928	244.0948	141.0340	5.4316	4
5	81.9360	0.3415	0.1415	3.8225	3.2160	305.1185	176.2675	6.7895	5
6	98.3232	0.4098	0.1698	4.5870	3.8392	366.1422	211.5010	8.1474	6
7	114.7104	0.4781	0.1978	5.3515	4.4624	427.1659	246.7345	9.5053	7
8	131.0976	0.5464	0.2258	6.1160	5.0856	488.1896	281.9680	10.8632	8
9	147.4848	0.6147	0.2538	6.8805	5.7088	549.2133	317.2015	12.2211	9
10	163.8720	0.6830	0.2818	7.6450	6.3320	610.2370	352.4350	13.5790	10







## SURFACE MEASURES.

CUSTOMARY TO METRIC.

METRIC TO CUSTOMARY.

NUMBER	SQ. INCHES TO SQ. CENTIM.	SQ. FEET TO SQ. METERS	SQ. YARDS TO SQ. METERS	ACRES TO HECTARES	SQ. MILES TO SQ. KILOM'S.	SQ. CENTIMETERS TO SQ. INCHES.	SQ. METERS TO SQ. FEET.	SQ. METERS TO SQ. YARDS	HECTARES TO ACRES	SQ. KILOMETERS TO SQ. MILES.	NUMBER
1	6.4516	.09290	.83613	.4047	2.5900	.15500	10.764	1.1959	2.4710	.3861	1
2	12.903	.18581	1.67226	.80939	5.1800	.3100	21.528	2.3919	4.9421	.7722	2
3	19.354	.27871	2.5084	1.21409	7.7700	.4650	32.298	3.5879	7.4131	1.1583	3
4	25.807	.37161	3.3445	1.61879	10.359	.6200	43.055	4.7839	9.8842	1.5444	4
5	32.258	.46452	4.1806	2.0225	12.949	.7750	53.819	5.9799	12.355	1.9305	5
6	38.710	.55742	5.0158	2.4282	15.539	.9300	64.583	7.1759	14.826	2.3166	6
7	45.161	.65032	5.8529	2.8328	18.129	1.0850	75.347	8.3719	17.297	2.7027	7
8	51.613	.74323	6.6891	3.2376	20.719	1.2400	86.111	9.5678	19.768	3.088	8
9	58.065	.83613	7.5252	3.6423	23.309	1.3950	96.875	10.739	22.239	3.4749	9
10	64.516	.92903	8.3613	4.0469	25.899	1.5500	107.638	11.959	24.710	3.8610	10

ONE SQ. STATUTE MILE = 259.00 HECTARES.

ONE HECTARE = .003861 SQ. STATUTE MILE.

## MISCELLANEOUS MEASURES.

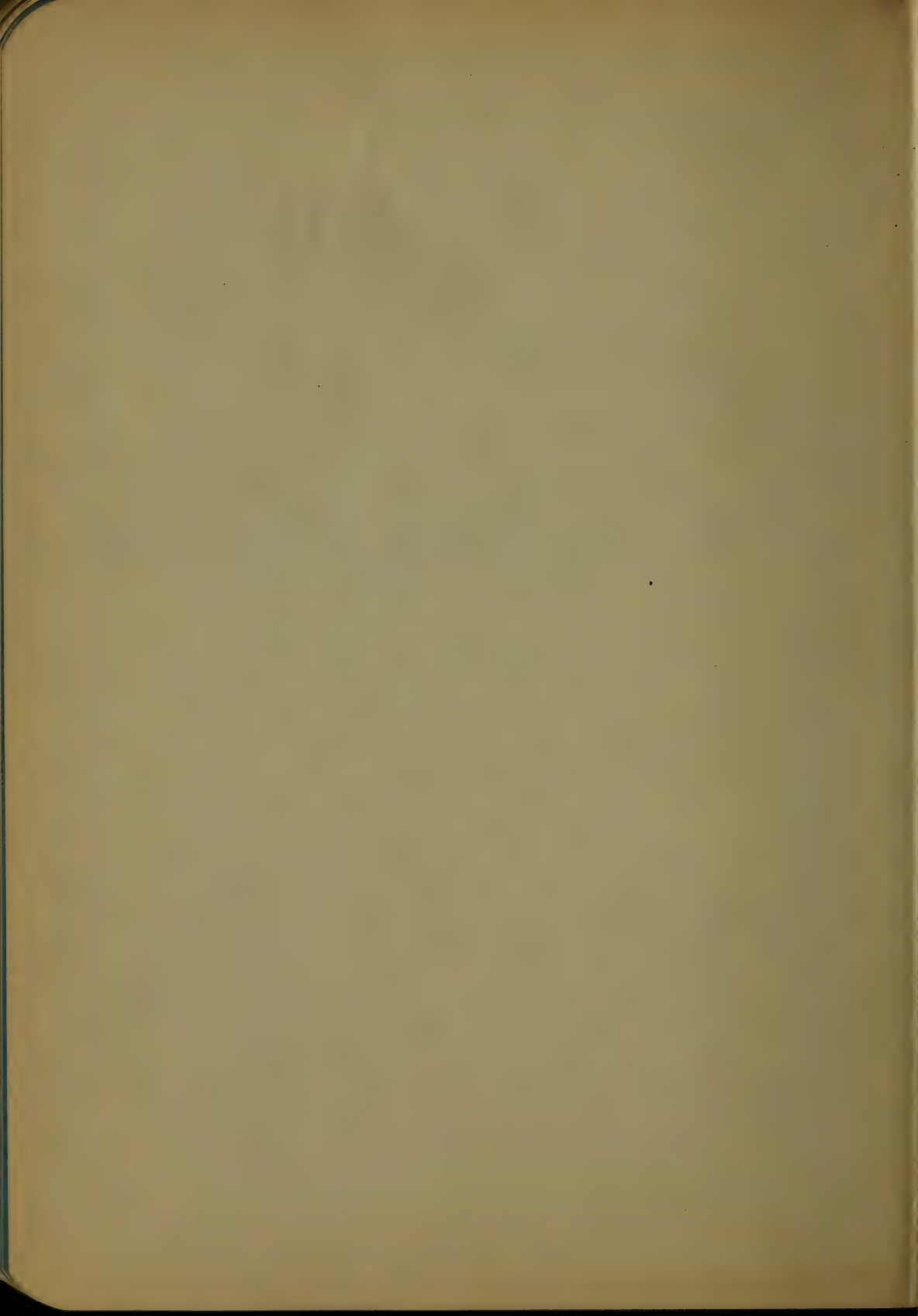
NUMBER	POUNDS PER LINEAL FT. TO KILOGRAMMES PER LINEAL METER	LBS. PER SQUARE INCH TO KILOGRAMMES PER SQ. CENTIMETER	LBS. PER SQ. FOOT TO KILOGRAMMES PER SQ. METRE	LBS. PER CUBIC FOOT TO KILOGRAMMES PER CUBIC METRE.	FOOT POUNDS TO KILOGRAMME METRE	U.S. HORSE POWER TO METRIC HORSEPOWER. E.C.	KILOGRAMMES PER LINEAL METRE TO LBS. PER LINEAL FOOT.	KILOGRAMMES PER SQUARE CENTIMETRE TO LBS. PER SQ. INCH.	KILOGRAMMES PER SQUARE METRE TO LBS. PER SQ. FOOT.	KILOGRAMMES PER CUBIC METRE TO LBS. PER CUBIC FOOT.	METRIC HORSE POWER TO U.S. HORSE POWER. E.C.	KILOGRAMME METRE TO FOOT POUNDS.	NUMBER
1	1.485	.07031	4.8824	16.018	.13826	1.01387	.67197	14.225	.30482	.06245	.98632	7.2330	1
2	2.976	.14061	9.765	32.037	.27651	2.02776	1.3439	28.447	.60963	1.2486	1.97264	14.4660	2
3	4.465	.21092	14.647	48.054	.41477	3.04162	2.0159	42.670	.91445	1.8728	2.96894	21.4789	3
4	5.953	.28123	19.530	64.074	.55302	4.05549	2.6878	56.894	1.1927	2.4971	3.94527	28.9319	4
5	7.441	.35153	24.412	80.092	.69126	5.06937	3.3598	71.117	1.48403	3.1214	4.93139	36.1145	5
6	8.929	.42184	29.291	96.110	.82933	6.08324	4.0318	85.340	1.77457	3.7437	5.91791	43.3773	6
7	10.417	.49215	34.177	112.128	.96753	7.09711	4.7038	99.564	1.957	4.3704	6.90423	50.6309	7
8	11.905	.56246	39.064	128.147	1.10564	8.11038	5.3757	113.787	1.6388	4.9943	7.89044	57.8839	8
9	13.393	.63276	43.951	144.165	1.24380	9.12486	6.0477	128.011	1.8434	5.6128	8.87865	65.0987	9
10	14.882	.70307	48.832	160.183	1.3826	10.13575	6.7197	142.231	2.0482	6.2424	9.86318	72.3400	10



# SPECIFIC GRAVITY AND WEIGHTS OF VARIOUS MATERIALS.

SPECIFIC GRAVITY OR SPECIFIC WEIGHT IS THE RATIO BETWEEN THE WEIGHT OF BODIES OF EQUAL VOLUME. THE BASIS FOR SPEC. GRAVITY IS PURE WATER AT 62° FAH., AND 30" BAROMETER.

MATERIALS.	AVERAGE		
	SPEC. GRAVITY WATER = 1	WEIGHT IN POUNDS.	CUB. FOOT INCH.
AIR AT 60° F. AND ATMOSPHERIC PRESSURE OF 14.7 LBS. PER SQ. INCH. WEIGHS $\frac{1}{815}$ TH. AS MUCH AS WATER. ....	.00123	.0765	
ALUMINUM CAST .....	2.56	159.8	.092
" " SHEET .....	2.67	166.6	.096
ANTIMONY CAST .....	6.70	418	.241
" " NATIVE .....	6.67	416	.240
ASH PERFECTLY DRY .....	.752	47	
ASH AMERICAN WHITE DRY .....	.61	38	
ASHES OF SOFT COAL SOLIDLY PACKED .....		40.45	
ASPHALTUM .....	1.4	87.3	
BASALT .....	2.9	181.	
BISMUTH CAST .....	9.82	613.1	.353
BRASS CAST (COPPER & ZINC 1) .....	8.1	504	
" " " (COPPER, ZINC & TIN) .....	8.3	516	
" " ROLLED " " " .....	8.4	524	.3
BRICK BEST PRESSED .....		150	
" COMMON AND HARD .....		125	
" SOFT INFERIOR .....		100	
BRICKWORK PRESSED BRICK .....		140	
" " MEDIUM QUALITY .....		125	
" " COARSE, INFERIOR .....		100	
" " AT 125 LBS. PER C. FT. ONE CUB. YARD = 1.507 TONS, AND 17.92 C. FEET = 1 TON.			
BRONZE (GUN METAL) COPPER 8, TIN 1 .....	8.561	534	.308
BEECH .....	.696	43	







## SPECIFIC GRAVITY &amp; WEIGHT OF MAT'S.

## MATERIALS.

AVERAGE  
SPEC. GRAVITY  
WATER=1  
WEIGHT IN  
POUNDS PER  
CUBIC  
FEET. INCH.

ALUMINUM BRONZE .....	7.7	499.46	.28
BIRCH .....	.73	45	.0267
BOX .....	.96	60	.0349
CEDAR WEST INDIES, AMERICAN, LEBANON, .....	748 to 786	47.35 to 50	.026
CEMENT AMERICAN ROSENDALE HYDR. ....			
" GROUND AND LOOSE .....		56	
" HYD. AM. ROS. & A. STRUCK BUSHEL .....		70	
" " CUMBERLAND GROUND .....		65	
" " " THOROUGHLY SHAKEN .....		85	
" " " PORTLAND ... LOOSE .....		88	
" " " " THOROUGHLY SHAKEN .....		110	
CHALK SOLID .....	2.33	145	
" GROUND .....	2.5	156	.09
CHARCOAL OF PINES AND OAKS .....		15 to 30	
CHERRY PERFECTLY DRY .....	.672	42	.0248
CHESTNUT .....	.660	41	.0239
CLAY FOR POTTERY DRY FROM 1.8 TO 2.1 .....	1.9	119	.071
" DRY IN LUMPS AND LOOSE .....		63	
COAL ANTHRACITE FROM 1.3 TO 1.84 .....	1.5	93.5	.056
" " BROKEN OF ANY SIZE, LOOSE .....		52 to 56	
" " " MODERATELY SHAKEN .....		56 to 60	
" " HEAPED BUSHEL LOOSE 77 to 83 <sup>lbs</sup> .....			
" " BROKEN 40 TO 43 CUB. FEET .....			
" " MAKES A TON. ....			
" BITUMINOUS, SOLID 1.2 TO 1.5 .....	1.35	84	.0413
" " SOLID CAMBRIA CO. PA. ....		79 to 84	
" B. BROKEN OF ANY SIZE LOOSE .....		47 to 52	
" " " MODERATELY SHAKEN .....		51 to 56	
" " HEAPED BUSHEL LOOSE 70 TO 78 LBS. ....			
" 1 TON BITUMINOUS COAL OCCUPIES .....			
" 43 TO 48 CUB. FEET. ....			
COKE LOOSE .....		23 to 32	
" " HEAPED BUSHEL 35 TO 42 LBS. ....			
" 1 TON OCC. 80 TO 97 CUB. FEET. ....			
CONCRETE CEMENT .....	2.2	137	.0788
" ORDINARY .....	1.9	119	.071
CORUNDUM PURE FROM 3.8 TO 4 .....	3.9		.14
CORK DRY .....	.24	15	.0087
CYPRESS AMERICAN DRY .....	.50	64	.0199

## SPECIFIC GRAVITY &amp; WEIGHTS OF MATERIALS.

MATERIALS.		SPEC. GRAVITY WATER=1	AVERAGE WEIGHT IN POUNDS PER CUBIC	
			FOOT.	INCH.
COPPER	BOLTS	8.85	552.4	.318
"	CAST	8.607	537.3	.31
"	SHEET	8.78	548.1	.316
"	WIRE	8.9	555	.32
"	PLATE	8.799	548.6	.317
EARTH	COMMON LOAM PERF DRY & LOOSE		72 to 80	
"	" " SHAKEN		82 to 92	
"	" " RAMMED		90 to 100	
"	" SLIGHTLY MOIST LOOSE		70 to 76	
"	" MORE " "		66 to 68	
"	" " SHAKEN		75 to 90	
"	" " PACKED		90 to 100	
"	" FLOWING MUD		104 to 112	
"	" " PRESSED		110 to 120	
EBONY		1.187	74	
ELM	PERF DRY	.56	35	
EMERY			250	
FLINT		2.6	162	
GLASS	FROM 2.5 TO 3.45	2.98	186	
"	COMMON WINDOW	2.52	157	
"	THICK FLOORING		159.5	
GNEISS	COMMON 2.62 TO 2.76	2.69	168	
"	IN LOOSE PILES		96	
GOLD	CAST, PURE OR 24 CARAT	19.252	1204	.697
"	PURE, HAMMERED	19.5	1217	.710
"	22 CARAT FINE	17.486	1267	.733
"	STANDARD	17.724	1106	.638
GRANITE	FROM 2.56 TO 2.88	2.72	170	
GREENSTONE	TRAP FROM 2.3 TO 3.2	3	187	
GUN-METAL	COPPER 90 TIN 10	8.459	528	.304
GYP SUM	PLASTER PARIS 2.24 TO 2.30	2.27	141.6	
"	IRREGULAR LUMPS		82	
"	GROUND LOOSE		56	
HEMLOCK	PERF. DRY	.4	25	
HICKORY	" "	.85	53	
HORN BEAM	" "	.76	47	
HORN BLEND	BLACK		203	
ICE	FROM .917 TO .922	.92	57.4	
IRONWOOD		1.15	71	







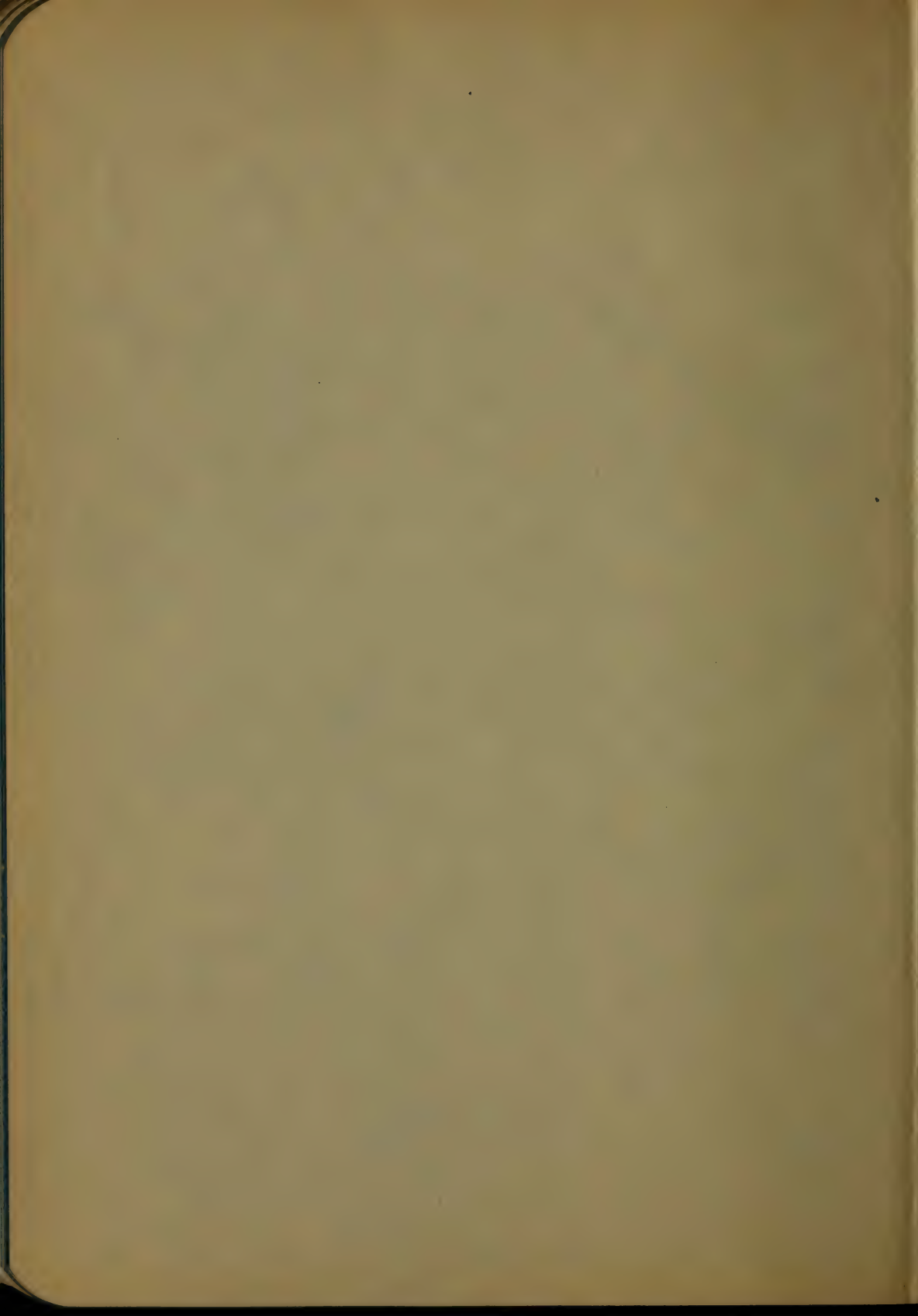
## SPECIFIC GRAVITY &amp; WEIGHTS OF MATERIALS.

MATERIALS	AVERAGE.		
	SPEC. GRAVITY WATER=1	WEIGHT IN LBS. PER CUBIC	
		FOOT	INCH.
IRON CAST, 7 to 7.4 .....	7.15	446	
" GRAY FOUNDRY COLD .....	7.21	450	.26
" " " MOLTEN .....	6.94	433	
" WROUGHT, 7.6 to 7.8 .....	7.69	480	.2778
" WIRE .....	7.78	485.6	.28
LARCH .....	.556	35	
LEAD CAST .....	11.36	708.5	.403
" ROLLED IN SHEET .....	11.41	711.6	.41
" TUBING .....	11.5	715	
LIGNUM VITAE DRY .....	.65 to .33	41 to 83	
LIMESTONE & MARBLES ...	2.6	164.4	
LIME QUICK .....	1.5	95	
" " GROUND, SHAKEN PER			
" " STRUCK BUSHEL 93½ LBS.		75	
LOCUST .....	.71	44	
MAHOGANY SPANISH DRY .....	.85	53	
" HONDURAS " .....	.56	35	
MAPLE DRY .....	.79	49	
MASONRY OF GRANITE OR LIMESTONE ...		165	
" " " WITH ½ MORTAR ..		154	
" " " WITH ¼ TO ⅓ " RUBBLE		150	
" " " WITH SCABBLED DRY "		138	
" OF SANDSTONE ⅛ LESS THAN OF			
" GRANITE .....		144	
MERCURY AT 32° FAH. ....	13.62	849	.492
MICA 2.75 to 3.1 .....	2.93	183	
MORTAR HARDENED 1.4 to 1.9	1.65	103	
MUD DRY, CLOSE .....		80 to 110	
" WET, MODERATELY PRESSED .....		110 to 130	
" " FLUID .....		104 to 120	
OAK LIVE, PERF. DRY .....	.95	59.3	
" WHITE " " .....	.77	48	
" RED, BLACK, PERF. DRY .....		32 to 45	
PETROLEUM .....	.878	54.8	
PINE WHITE PERF. DRY .....	.40	25	
" YELLOW NORTHERN " " .....	.55	34.3	
" " SOUTHERN " " .....	.72	45	
PITCH .....	1.15	71.7	
POPLAR DRY .....	.47	29	



## SPECIFIC GRAVITY &amp; WEIGHTS OF MATERIALS.

MATERIALS.	AVERAGE		
	SPEC. GRAVITY WATER=1	WEIGHT IN LBS. PER CUBIC FOOT	INCH.
PLATINUM PURE .....	21.5	1342	.775
" SHEET & WIRE .....	23	1436	.828
ROSIN .....	1.10	68.6	
QUARTZ .....	2.65	165	
SALT COARSE, STRUCK BUSHEL 56 LBS.		45	
" GROUND .....		58	
SAND OF PURE QUARTZ PERF. DRY		90-106	
" " " " VOIDS FULL OF WATER		118 to 129	
" " " " VERY LARGE & SMALL			
" " " " GRAINS DRY .....		117	
SANDSTONE 2.1 to 2.3 cu ft 131 to 171 lb LBS.	2.41	151	
" QUARRIED AND PILED .....		86	
SNOW FRESH FALLEN .....		5 to 12	
" MOISTENED, COMPACTED BY RAIN		15 to 50	
SYCAMORE PERF. DRY .....	.59	37	
SHALES RED OR BLACK 2.4 to 2.8	2.6	162	
SLATE 2.7 to 2.9 .....	2.8	175	
SILVER PURE .....	10.5	655	.377
" STANDARD .....	10.31	644	.371
SOAPSTONE 2.65 to 2.8 .....	2.73	170	
SPRUCE PERFECTLY DRY .....	.4	25	
STEEL .....	8	499	.288
" PLATES .....	7.85	490	.284
" FLUID .....		400	
SULPHUR .....	2.0	125	
TALLOW .....	.94	58.6	
TAR .....	1	62.36	
TEAK .....	.74	46	
TIN CAST 7.2 to 7.5 .....	7.35	459	.268
TRAP COMPACT .....		187	
" QUARRIED AND PILED .....		107	
WALNUT BLACK PERF. DRY .....	.61	38	
WATER PURE RAIN DESTILLED AT 32° F.			
" AND BAROMETER 30 INCHES		62.417	
" AT 62° F. BAR 30 "	1	62.355	
" AT 212° F. BAR 30 "		59.7	
" SEA 1.026 to 1.030 .....	1.028	64.08	
ZINC OR SPELTER 6.8 to 7.2 .....	7	437	.252







# PROPERTIES OF METALS AND OTHER SUBSTANCES IN COMMON USE.

METALS	WEIGHT OF CU. INCH PER LBS.	TENSILE STRENGTH.			EXPANSION COEFFICIENTS			TEMPERATURE DEGR. FAH.		HEAT SPECIFIC	LATENT HEAT OF FUSION & VAPORIZATION
		CRUSHING WEIGHT.	TRANSVERSE STRENGTH.	TONS PER SQ. IN.	LINEAL EXPANSION	SURFACE EXPANSION	CUBIC EXPANSION	FUSION	VAPORIZATION		
ALUMINUM	.096							1400°		.0210	
ANTIMONY	.242	.47						800		.0512	
BISMUTH	.353	1.45						480		.0305	28.75
COPPER	.318	17.0			$\frac{1}{5} 955$	$\frac{1}{4} 191$	$\frac{1}{2} 2864$	2100		.0951	
GOLD	.665	9.1			$\frac{1}{5} 745$	$\frac{1}{4} 1590$	$\frac{1}{2} 2385$	1898		.0324	
WR. IRON	.277	22.0	16.9	3.3	$\frac{1}{5} 686$	$\frac{1}{4} 1372$	$\frac{1}{2} 2058$	2412	5000	.1138	
CAST "	.26	7.3	48	2.6	$\frac{1}{5} 617$	$\frac{1}{4} 1234$	$\frac{1}{2} 185$	2192	3300	.1298	
LEAD	.408	.8	3.1		$\frac{1}{5} 189$	$\frac{1}{4} 378$	$\frac{1}{2} 577$	626		.0314	9.67
MERCURY	.491	FLUID.			$\frac{1}{4} 3334$	$\frac{1}{4} 6668$	$\frac{1}{5} 1001$	-378	662	.0333	5.07 167
PLATINUM	.775				$\frac{1}{5} 495$	$\frac{1}{4} 990$	$\frac{1}{2} 1485$	3632		.0324	
SILVER	.377	18.2			$\frac{1}{5} 69$	$\frac{1}{4} 139$	$\frac{1}{2} 207$	1750		.057	37.93
STEEL DART	.284	35.	90		$\frac{1}{5} 599$	$\frac{1}{4} 1198$	$\frac{1}{2} 1798$	2520		.1165	
" TEMPER'D	.288	52.	150		$\frac{1}{5} 702$	$\frac{1}{4} 1404$	$\frac{1}{2} 2106$	2600		.1175	
TIN	.262	2.0	6.7		$\frac{1}{4} 141$	$\frac{1}{2} 282$	$\frac{1}{4} 3229$	446		.0562	25.75
ZINC	.252	3.3			$\frac{1}{4} 1634$	$\frac{1}{4} 3268$	$\frac{1}{4} 4903$	680	1400	.0956	50.63 47.3
BRASS	.3	9.3			$\frac{1}{4} 1037$	$\frac{1}{4} 2074$	$\frac{1}{4} 3112$	1900		.0939	
GLASS	.091	1.9			$\frac{1}{5} 456$	$\frac{1}{5} 912$	$\frac{1}{5} 1368$	2370		.0937	
ICE	.033				$\frac{1}{4} 86$	$\frac{1}{3} 172$	$\frac{1}{3} 258$	32	212		
GASES							$\frac{1}{2} 2033$				
WATER	.036	PER GALL. 8.33						32	212	1.00	142.6 969.5
STEAM										.4805	
ALCOHOL	6.93	LBS. PER GALL.			$\frac{1}{3} 1926$	$\frac{1}{3} 385$	$\frac{1}{3} 578$	UN- KNOWN	173	.7000	372
TURPENT.	7.16	"	"	"				14	313	.426	124

\* NOTE:  $\frac{1}{5}$  = 000  $\frac{1}{3}$  = 00000 ETC.









# COMPARISON OF THERMOMETER SCALES.

FAHRENHEIT  $F = 32 + \frac{9}{5}C = 32 + \frac{9}{4}R$ , ... 32° 212°

CELSIUS  $C = \frac{5}{9}R = \frac{5}{9}(F - 32)$ , ... 0° 100°

REAUMUR  $R = \frac{4}{5}C = \frac{4}{9}(F - 32)$ , ... 0° 80°

+ INDICATES TEMPERATURE ABOVE FREEZING-POINT 0°C, 32°F AND 50°F AND - INDICATES TEMPERATURE BELOW 0°C, -

F	C	R	F	C	R	F	C	R
+	+	+	+	+	+	+	+	+
300	148.88	119.10	277.25	136.25	109	254	123.58	98.65
299.75	148.75	119	277	136.08	108.85	253.4	123	98.4
299	148.32	118.65	276.8	136	108.8	253	122.76	98.2
298.4	148	118.4	276	135.52	108.4	252.5	122.5	98
298	147.76	118.2	275	135	108	252	122.2	97.75
297.5	147.5	118	274	134.44	107.85	251.4	122	97.6
297	147.2	117.75	273.2	134	107.2	251	121.64	97.3
296.6	147	117.6	273	133.88	107.1	250.25	121.25	97
296	146.64	117.3	272.75	133.75	107	250	121.08	96.85
295.25	146.25	117	272	133.32	106.65	249.8	121	96.8
295	146.08	116.85	271.4	133	106.4	249	120.52	96.4
294.8	146	116.8	271	132.76	106.2	248	120	96
294	145.52	116.4	270.5	132.5	106	247	119.44	95.55
293	145	116	270	132.2	105.75	246.2	119	95.2
292	144.44	115.55	269.6	132	105.6	246	118.48	95.1
291.2	144	115.2	269	131.64	105.3	245.75	118.75	95
291	143.88	115.1	268.25	131.25	105	245	118.32	94.65
290.75	143.75	115	268	131.08	104.85	244.4	118	94.4
290	143.32	114.65	267.8	131	104.8	244	117.76	94.2
289.4	143	114.4	267	130.52	104.4	243.5	117.5	94
289	142.76	114.2	266	130	104	243	117.2	93.75
288.5	142.5	114	265	129.44	103.55	242.6	117	93.6
288	142.2	113.75	264.2	129	103.2	242	116.64	93.3
287.6	142	113.6	264	128.88	103.1	241.25	116.25	93
287	141.64	113.3	263.75	128.75	103	241	116.08	92.85
286.25	141.25	113	263	128.32	102.65	240.8	116	92.8
286	141.08	112.85	262.4	128	102.4	240	115.52	92.4
285.8	141	112.8	262	127.76	102.2	239	115	92
285	140.52	112.4	261.5	127.5	102	238	114.44	91.55
284	140	112	261	127.2	101.75	237.2	114	91.2
283	139.44	111.55	260.6	127	101.6	237	113.88	91.1
282.2	139	111.2	260	126.64	101.3	236.75	113.75	91
282	138.88	111.1	259.25	126.25	101	236	113.32	90.65
281.75	138.75	111	259	126.08	100.85	235.4	113	90.4
281	138.32	110.65	258.8	126	100.8	235	112.76	90.2
280.4	138	110.4	258	125.52	100.4	234.5	112.5	90
280	137.76	110.2	257	125	100	234	112.2	89.75
279.5	137.5	110	256	124.44	99.85	233.6	112	89.6
279	137.2	109.75	255.2	124	99.2	233	111.64	89.3
278.6	137	109.6	255	123.88	99.1	232.25	111.25	89
278	136.64	109.3	254.75	123.75	99	232	111	88.85



F	C	R	F	C	R	F	C	R
+	+	+	199	92.76	74.2	168.2	74	59.2
231.8	111	88.8	198.5	92.5	74	168	73.88	59.1
231	110.52	88.4	198	92.2	73.75	164.75	73.75	59.0
230	110	88	197.6	92	73.6	164	73.52	58.65
229	109.44	87.55	197	91.64	73.6	163.4	73	58.4
228.2	109	87.2	196.25	91.25	73	163	72.76	58.2
228	108.88	87.1	196	91.08	72.55	162.5	72.5	58
227.75	108.75	87	195.8	91	72.4	162	72.2	57.75
227	108.32	86.65	195	90.52	72.4	161.4	72	57.6
226.4	108	86.4	194	90	72	161	71.64	57.3
226	107.76	86.2	193	89.44	71.55	160.25	71.55	57
226.5	107.5	86	192.2	89	71.2	160	71.08	56.85
226	107.2	85.75	192	88.88	71.1	159.8	71	56.5
224.6	107	85.6	191.75	88.75	71	159	70.52	56.4
224	106.64	85.3	191	88.32	70.65	158	70	56
223.15	106.25	85	190.4	88	70.4	157	69.44	55.55
223	106.08	84.85	190	87.76	70.2	156.2	69	55.2
222.8	106	84.8	189.5	87.5	70	156	68.88	55.1
222	105.52	84.4	189	87.2	69.75	155.75	68.75	55
221	105	84	188.6	87	69.6	155	68.52	54.65
220	104.44	83.55	188	86.64	69.3	154.4	68	54.4
219.2	104	83.2	187.25	86.25	69	154	67.76	54.2
219	103.88	83.1	187	86.08	68.55	153.5	67.5	54
218.75	103.75	83	186.4	86	68.8	153	67.2	53.75
218	103.32	82.65	186	85.52	68.4	152.6	67	53.6
217.4	103	82.4	185	85	68	152	66.64	53.3
217	102.76	82.2	184	84.44	67.55	151.25	66.25	53
216.5	102.5	82	183.2	84	67.2	151	66.08	52.85
216	102.2	81.75	183	83.88	67.1	150.8	66	52.8
215.6	102	81.6	182.75	83.75	67	150	65.52	52.4
215	101.64	81.3	182	83.32	66.65	149	65	52
214.25	101.25	81	181.4	83	66.4	148	64.44	51.55
214	101.08	80.85	181	82.76	66.2	147.2	64	51.2
213.8	101	80.8	180.5	82.5	66	147	63.88	51.1
213	100.52	80.4	180	82.2	66.75	146.75	63.75	51
<b>212°</b>	<b>100°</b>	<b>80°</b>	179.6	82	65.6	146	63.32	50.65
211	99.44	79.55	179	81.64	65.3	145.4	63	50.4
210.2	99	79.2	178.25	81.25	65	145	62.76	50.2
210	98.88	79.1	178	81.08	64.85	144.5	62.5	50
209.75	98.75	79	177.8	81	64.8	144	62.2	49.75
209	98.32	78.88	177	80.52	64.4	143.6	62	49.6
208.4	98	78.4	176	80	64	143	61.64	49.3
208	97.76	78.2	175	79.44	63.55	142.25	61.25	49
207.5	97.5	78	174.2	79	63.2	142	61.08	48.85
207	97.2	77.75	174	78.88	63.1	141.8	61	48.8
206.6	97	77.6	173.75	78.75	63	141	60.52	48.4
206	96.64	77.3	173	78.32	62.65	140	60	48
205.25	96.25	77	172.4	78	62.4	139	59.44	47.55
205	96.08	76.85	172	77.76	62.2	138.2	59	47.2
204.8	95.8	76.8	171.5	77.5	62	138	58.88	47.1
204	95.52	76.4	171	77.2	61.75	137.75	58.75	47
203	95	76	170.6	77	61.6	137	58.32	46.85
202	94.44	75.55	170	76.64	61.3	136.4	58	46.8
201.2	94	75.2	169.25	76.25	61	136	57.76	46.2
201	93.88	75.1	169	76.08	60.85	135.5	57.5	46
200.75	93.75	75	168.8	75.8	60.8	135	57.2	45.75
200	93.32	74.65	168	75.52	60.4	134.6	57	45.6
199.4	93	74.4	167	75	60	134	56.64	45.3
			166	74.44	59.55	133.25	56.25	45







F	C	R	F	C	R	F	C	R
+	+	+	99	37.2	29.75	64.4	12	14.4
135	56.48	44.45	98.6	37	29.6	64	17.36	14.2
132.5	56	44.5	98	36.44	29.5	63.5	17.3	14
132	55.52	44.4	97.25	36.15	29	63	17.2	13.75
131	55	44.3	97	36.08	28.85	62.6	17	13.6
130	54.44	44.25	96.8	36	28.8	62	16.84	13.3
129.2	54	44.2	96	35.72	28.4	61.25	16.82	13
129	53.16	43.1	95	35	28	61	16.48	12.85
128.75	53.75	43	94	34.44	27.75	60.8	16	12.8
128	53.32	42.65	93.2	34	27.8	60	15.82	12.4
127.6	53	42.4	93	33.82	27.1	59	15	12
127	52.76	42.2	92.75	33.78	27	58	14.44	11.75
126.5	52.5	42	92	33.32	26.45	57.2	14	11.8
126	52.2	41.75	91.4	33	26.4	57	13.88	11.1
125.6	52	41.6	91	32.76	26.2	56.75	13.78	11
125	51.64	41.3	90.5	32.5	26	56	13.42	10.88
124.25	51.25	41	90	32.2	25.75	55.4	13	10.4
124	51.08	40.75	89.6	32	26.6	55	12.76	10.2
123.8	51	40.8	89	31.64	25.8	54.5	12.5	10
123	50.52	40.4	88.25	31.25	25	54	12.2	9.75
122	50	40	88	31.08	24.75	53.6	12	9.4
121	49.44	39.55	87.2	31	24.4	53	11.64	9.3
120.7	49	39.2	87	30.72	24.4	52.25	11.25	9
120	48.88	39.1	86	30	24	52	11.08	8.85
119.75	48.75	39	85	29.44	23.65	51.8	11	8.9
119	48.32	38.45	84.2	29	23.2	51	10.12	8.4
118.4	48	38.4	84	28.58	23.1	50	10	8
118	47.76	38.2	83.75	28.25	22	49	9.44	7.55
117.5	47.5	38	83	28.32	22.4	48.2	9	7.2
117	47.2	37.75	82.4	28	22.4	48	8.88	7.1
116.6	47	37.6	82	27.74	22.2	47.75	8.75	7
116	46.64	37.3	81.5	27.5	22	47	8.32	6.85
115.25	46.25	37	81	27.2	21.75	46.4	8	6.4
115	46.08	36.85	80.6	27	21.6	46	7.76	6.2
114.8	46	36.6	80	26.64	21.5	45.5	7.5	6
114	45.52	36.4	79.25	26.25	21	45	7.2	5.75
113	45	36	79	26.08	20.25	44.6	7	5.4
112	44.44	35.75	78.2	26	20.5	44	6.64	5.3
111.8	44	35.2	78	25.72	20.4	43.25	6.25	5
111	43.88	35.1	77	25	20	43	6.08	4.85
110.75	43.75	35	76	24.44	19.65	42.8	6	4.8
110	43.32	34.82	75.2	24	19.2	42	5.82	4.4
109.4	43	34.4	75	23.82	19.1	41	5	4
109	42.76	34.2	74.75	23.72	19	40	4.44	3.55
108.5	42.5	34	74	23.42	18.65	39.2	4	3.2
108	42.2	33.75	73.4	23	18.4	39	3.88	3.1
107.6	42	33.6	73	22.76	18.2	38.75	3.78	3
107	41.64	33.3	72.5	22.5	18	38	3.42	2.65
106.25	41.25	33	72	22.8	17.75	37.4	3	2.4
106	41.08	32.8	71.6	22	17.6	37	2.76	2.2
105.2	41	32.5	71	21.64	17.3	36.5	2.5	2
105	40.52	32.4	70.25	21.25	17	36	2.2	1.75
104	40	32	70	21.08	16.75	35.6	2	1.6
103	39.44	31.75	69.2	21	16.8	35	1.64	1.3
102.8	39	31.2	69	20.72	16.4	34.25	1.52	1
102	38.88	31.1	68	20	16	34	1.02	0.85
101.75	38.75	31	67	19.44	15.65	33.8	1	0.8
101	38.32	30.65	66.2	19	16.2	33	0.82	0.6
100.4	38	30.4	66	18.88	15.1	32°	0°	0°
100	37.76	30.2	65.75	18.75	15	+31	-0.55	-0.44
99.4	37.5	30	65	18.32	14.65			



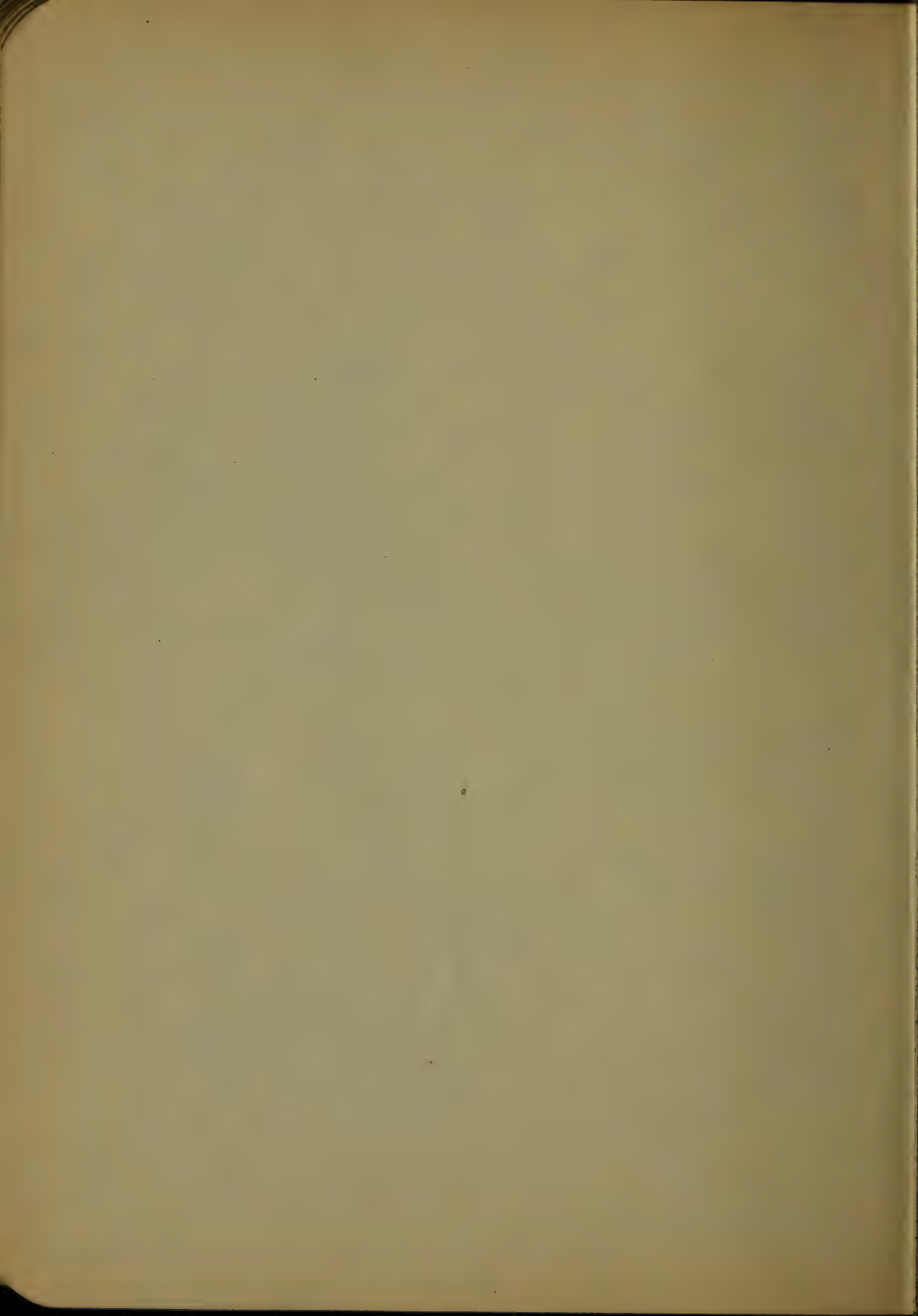
F	C	R	F	C	R	F	C	R
+30.2	-	-0.2	+13	-10.55	-8.24	-	-	-
+30	-1.11	-0.28	+12.2	-11	-8.8	3	19.44	15.55
+29.75	-1.25	-1	+12	-11.11	-8.88	4	20	16
+29	-1.44	-1.33	+11.75	-11.25	-9	5	20.55	16.44
+28.4	-2	-1.6	+11	-11.64	-9.33	5.2	21	16.8
+28	-2.22	-1.77	+10.4	-12	-9.6	6	21.11	16.88
+27.5	-2.5	-2	+10	-12.12	-9.77	6.25	21.25	17
+27	-2.77	-2.22	+9.5	-12.5	-10	7	21.44	17.23
+26.6	-3	-2.4	+9	-12.77	-10.22	7.6	22	17.6
+26	-3.33	-2.66	+8.6	-13	-10.4	8	22.22	17.77
+25.25	-3.75	-3	+8	-13.33	-10.66	8.5	22.5	18
+25	-3.98	-3.11	+7.25	-13.75	-11	9	22.77	18.22
+24.8	-4	-3.2	+7	-13.88	-11.11	9.4	23	18.4
+24	-4.44	-3.55	+6.8	-14	-11.2	10	23.33	18.66
+23	-5	-4	+6	-14.44	-11.55	10.75	23.75	19
+22	-5.55	-4.24	+5	-15	-12	11	23.88	19.11
+21.2	-6	-4.5	+4	-15.55	-12.44	11.8	24	19.2
+21	-6.11	-4.82	+3.2	-16	-12.8	12	24.44	19.55
+20.75	-6.25	-5	+3	-16.11	-12.88	13	25	20
+20	-6.64	-5.33	+2.75	-16.75	-13	14	25.44	20.44
+19.4	-7	-5.6	+2	-16.44	-13.33	14.8	26	20.8
+19	-7.11	-5.77	+1.4	-17	-13.6	15	26.11	20.88
+18.5	-7.5	-6	+1	-17.22	-13.77	15.25	26.25	21
+18	-7.77	-6.22	+0.5	-17.5	-14	16	26.64	21.33
+17.6	-8	-6.4	O	-17.77	-14.22	16.6	27	21.6
+17	-8.33	-6.66	-0.4	-18	-14.4	17	27.22	21.77
+16.25	-8.75	-7	-1	-18.33	-14.66	17.5	27.5	22
+16	-9	-7.11	-1.75	-18.75	-15	18	27.77	22.22
+15.8	-9	-7.2	-2	-19	-15.11	18.4	28	22.4
+15	-9.44	-7.55	-2.2	-19.22	-15.22	19	28.33	22.66
+14	-10	-8		-19	-15.5	19.75	28.75	23
						20	29	23.11
						20.2	29.2	23.2
						21	29.44	23.55
						22	30	24
						23	30.22	24.44
						23.5	31	24.8
						24	31.11	24.88
						24.25	31.25	25
						25	31.44	25.33
						25.6	32	25.6
						26	32.22	25.77
						26.5	32.5	26
						27	32.77	26.22
						27.4	33	26.4
						28	33.33	26.66
						28.75	33.75	27
						29	34	27.11
						29.2	34.2	27.2
						30	34.44	27.55
						31	35	28
						32	35.22	28.44
						32.8	36	28.8
						33	36.11	28.88
						33.25	36.25	29
						34	36.44	29.33
						34.6	37	29.6
						35	37.22	29.77
						35.5	37.5	30
						36	37.77	31.11
						36.4	38	31.4
						37	38.22	31.66

MERCURY THERMOMETERS ARE USED TO MEASURE HEAT AS HIGH AS 472° FAH. TO 600° FAH. AND ALCOHOL THERMOMETERS TO MEASURE TEMPERATURES BETWEEN -40° FAH. AND -160° FAH.

FOR

HIGHER TEMPERATURES PYROMETERS ARE USED UP TO 5000° FAH.

MUCH HIGHER TEMPERATURES ARE MEASURED BY COMPARISON OF THE SPECIFIC HEAT OF A KNOWN BODY (LIKE PLATINUM) TO THE UNKNOWN OF EQUAL WEIGHTS.







## WIRE AND SHEET METAL GAUGES.

IN DECIMALS OF AN INCH.

NUMBER OF GAUGE.	LEGALIZED MARCH 3, 1893 U.S. STANDARD SHEET-PLATE, IN IRON & STEEL.	AMERICAN BROWN & SHARPE WIRE.	BIRMINGHAM OR STUBS IRON WIRE.	WASHINGTON & MORRIS MFG. CO. LARGESIZE WIRE.	BRITISH EMERALD WIRE.	STUBS STEEL WIRE.	TRENTON IRON CO. WIRE.	AMERICAN SCREW WIRE.	NUMBER OF GAUGE.
000000	.5000	.....	.....	.....	.500	.....	.....	.....	000000
000000	.46875	.....	.....	.4600	.464	.....	.....	.....	000000
000000	.4375	.....	.....	.4300	.432	.....	.....	.....	000000
0000	.40625	.4000	.454	.3958	.400	.....	.400	.....	0000
000	.375	.40964	.425	.3625	.372	.....	.360	.0345	000
00	.34375	.3644	.38	.3310	.348	.....	.350	.0447	00
0	.3125	.33486	.34	.3065	.324	.....	.305	.0578	0
1	.28125	.2895	.35	.2830	.300	.227	.285	.0700	1
2	.2500	.25763	.284	.2625	.276	.219	.245	.0842	2
3	.225	.22942	.259	.2437	.252	.212	.245	.0975	3
4	.20375	.20481	.238	.2253	.232	.207	.225	.1105	4
5	.1875	.18194	.22	.2070	.212	.204	.205	.1236	5
6	.1625	.16202	.205	.1920	.192	.201	.190	.1368	6
7	.14375	.14428	.18	.1770	.176	.199	.175	.1500	7
8	.125	.12849	.165	.1620	.160	.197	.160	.1631	8
9	.10625	.11443	.148	.1483	.144	.194	.145	.1743	9
10	.09375	.10189	.134	.1350	.123	.191	.130	.1898	10
11	.08125	.090742	.12	.1205	.116	.191	.1175	.2006	11
12	.0700	.080808	.109	.1075	.104	.183	.105	.2153	12
13	.05875	.071961	.095	.0915	.092	.182	.0925	.2289	13
14	.0475	.064084	.083	.0800	.080	.180	.0806	.2481	14
15	.03625	.057068	.072	.0720	.072	.178	.070	.2632	15
16	.025	.05082	.065	.0625	.064	.175	.061	.2784	16
17	.01375	.045257	.058	.0540	.056	.172	.0525	.2946	17
18	.0125	.040303	.049	.0453	.048	.168	.045	.3047	18
19	.01125	.03589	.042	.0410	.040	.164	.040	.3079	19
20	.0100	.031961	.035	.0348	.036	.161	.035	.3210	20
21	.00875	.028442	.032	.03175	.032	.157	.031	.3342	21
22	.0075	.025347	.028	.0286	.028	.155	.028	.3474	22
23	.00625	.022571	.025	.0258	.024	.153	.025	.3604	23
24	.005	.0201	.022	.0230	.022	.151	.0225	.3737	24
25	.00375	.0179	.02	.0204	.020	.148	.020	.3868	25
26	.0025	.01594	.018	.0181	.018	.144	.018	.4000	26
27	.001875	.014195	.016	.0173	.0164	.143	.017	.4132	27
28	.001625	.012641	.014	.0162	.0169	.139	.016	.4263	28
29	.00140625	.011267	.013	.0150	.0156	.134	.015	.4393	29
30	.00125	.010025	.012	.0140	.0144	.137	.014	.4524	30
31	.00109375	.008928	.01	.0132	.0116	.120	.013	.4653	31
32	.001015625	.007945	.009	.0123	.0108	.115	.012	.4790	32
33	.0009375	.00708	.008	.0113	.0100	.112	.011	.4921	33
34	.000859375	.006304	.007	.0104	.0092	.110	.010	.5053	34
35	.00078125	.005614	.005	.0095	.0084	.108	.0095	.5184	35
36	.000703125	.005	.004	.0090	.0074	.106	.009	.5316	36
37	.000625	.004453	.....	.0085	.0068	.103	.0085	.5448	37
38	.....	.003968	.....	.0080	.0060	.101	.008	.5579	38
39	.....	.0034931	.....	.0075	.0052	.099	.0075	.5711	39
40	.....	.003144	.....	.0070	.0048	.097	.007	.5842	40



# WEIGHTS OF SHEETS AND PLATES OF STEEL WROUGHT IRON COPPER & BRASS.

	AMERICAN OR BROWN AND SHARPE GAUGE. WEIGHT IN LBS PER SQ. FOOT.				BIRMINGHAM GAUGE. WEIGHT IN LBS PER SQ. FOOT.			
	STEEL	IRON	COPPER	BRASS	STEEL	IRON	COPPER	BRASS
0000	15.7480	15.4000	20.3380	19.4330	15.5232	15.1161	21.5640	19.4312
000	16.7134	16.3857	18.5568	17.5327	17.3400	17.010	19.5625	18.1400
00	14.4237	14.2912	16.5753	15.6135	15.5040	15.200	17.2140	15.2440
0	13.2545	12.9044	14.7162	13.9041	13.8720	13.60	15.4020	14.5520
1	11.8053	11.5719	13.1052	12.3814	12.3400	12.00	13.5900	12.4400
2	10.5772	10.3020	11.8705	11.0564	11.0872	11.36	12.8652	12.1532
3	9.3402	9.1740	10.5929	9.8193	10.5473	10.37	11.7327	11.0452
4	8.3357	8.1723	9.4257	8.7443	9.7194	9.53	10.7814	10.1864
5	7.4232	7.2776	8.2419	7.7870	8.9760	8.80	9.9660	9.4160
6	6.6105	6.4809	7.3396	6.9344	8.2340	8.12	9.1960	8.6824
7	5.8868	5.7714	6.5361	6.1754	7.5440	7.20	8.5440	7.7040
8	5.2424	5.1396	5.8206	5.4994	6.7320	6.60	7.7445	7.2620
9	4.6685	4.5769	5.1834	4.8973	6.0384	5.92	6.7044	6.3040
10	4.1574	4.0759	4.6159	4.3612	5.4472	5.56	6.0702	5.7352
11	3.7083	3.6297	4.1104	3.8358	4.8940	4.80	5.4560	5.1560
12	3.2970	3.2223	3.6644	3.4586	4.4472	4.36	4.9372	4.6680
13	2.9360	2.8685	3.2699	3.0806	3.9760	3.90	4.3035	4.0640
14	2.6146	2.5494	2.9030	2.7428	3.5844	3.32	3.7899	3.5524
15	2.3284	2.2827	2.5852	2.4425	3.2876	2.88	3.2616	3.0816
16	2.0753	2.0358	2.3082	2.1751	2.9580	2.40	2.9445	2.7820
17	1.8445	1.8103	2.0661	1.9370	2.6664	2.12	2.6274	2.4824
18	1.6444	1.6181	1.8507	1.7250	2.3992	1.96	2.2197	2.0972
19	1.4645	1.4336	1.6228	1.5341	2.1736	1.68	1.9026	1.7976
20	1.3040	1.2784	1.4478	1.3679	1.9280	1.40	1.5855	1.4480
21	1.1612	1.1385	1.2893	1.2182	1.7046	1.28	1.4466	1.3596
22	1.0341	1.0138	1.1482	1.0848	1.4424	1.12	1.2684	1.1924
23	.9209	.9028	1.0225	.9661	1.2000	1.00	1.1324	1.0760
24	.8201	.8040	.9106	.8603	.9976	.88	.9964	.9616
25	.7303	.7160	.8108	.7661	.8160	.80	.8660	.8510
26	.6504	.6376	.7211	.6828	.7344	.72	.8154	.7704
27	.5792	.5678	.6430	.6075	.6528	.64	.7248	.6848
28	.5157	.5056	.5726	.5410	.5712	.56	.6342	.5992
29	.4593	.4503	.5099	.4818	.5304	.52	.5829	.5544
30	.4090	.4010	.4541	.4291	.4896	.48	.5436	.5136
31	.3643	.3571	.4044	.3821	.4430	.40	.4930	.4610
32	.3244	.3180	.3601	.3402	.3972	.36	.4477	.4222
33	.2883	.2832	.3207	.3030	.3564	.32	.3924	.3684
34	.2572	.2522	.2856	.2698	.3156	.28	.3471	.3296
35	.2297	.2246	.2544	.2403	.2840	.20	.3263	.2940
36	.2040	.2000	.2245	.2140	.2432	.16	.2872	.2712
37	.1817	.1781	.2017	.1945				
38	.1617	.1586	.1796	.1727				
39	.1441	.1412	.1619	.1551				
40	.1283	.1257	.1424	.1345				

BASIS OF CALCULATION :	STEEL	IRON.	COPPER	BRASS.
WEIGHT OF A CUBIC FOOT	489.6	480.0	543.6	513.6
WEIGHT OF A CUBIC INCH	.2833	.2778	.3146	.2972
SPECIFIC GRAVITIES.	7.85	7.70	8.72	8.24







# WEIGHTS OF SQUARE AND ROUND BARS OF STEEL AND WROUGHT IRON.

WEIGHTS IN LBS. PER LINEAL FOOT.

SIZE IN INCHES	STEEL.		IRON.		SIZE IN INCHES	STEEL.		IRON.	
	■	●	■	●		■	●	■	●
0 1/16	.015	.010	.013	.010	3 1/16	31.86	25.04	31.86	24.55
1/8	.052	.042	.052	.041	1/8	33.20	26.08	32.55	25.57
3/16	.110	.099	.117	.092	3/16	34.55	27.15	33.87	26.60
1/4	.167	.157	.168	.154	1/4	35.92	28.20	35.21	27.65
5/16	.233	.221	.236	.225	5/16	37.31	29.30	36.48	28.73
3/8	.278	.275	.289	.268	3/8	38.73	30.42	37.97	29.82
7/16	.351	.341	.358	.351	7/16	40.18	31.56	39.19	30.94
1/2	.450	.447	.463	.454	1/2	41.65	32.71	40.35	32.07
9/16	.574	.565	.585	.573	9/16	43.14	33.90	42.20	33.23
5/8	.728	.718	.732	.723	5/8	44.64	35.09	43.80	34.40
11/16	.908	.898	.917	.907	11/16	46.16	36.31	45.33	35.60
3/4	1.113	1.102	1.125	1.113	3/4	47.72	37.56	46.88	36.82
7/8	1.345	1.333	1.358	1.345	7/8	49.32	38.81	48.47	38.05
1	1.603	1.590	1.628	1.614	1	51.05	40.10	50.05	39.31
1 1/16	1.889	1.875	1.910	1.895	1 1/16	52.71	41.40	51.68	40.59
1 1/8	2.200	2.185	2.233	2.218	1 1/8	54.40	42.73	53.35	41.84
1 1/4	2.535	2.519	2.575	2.559	1 1/4	56.11	44.07	55.01	43.21
1 1/2	2.895	2.878	2.933	2.916	1 1/2	57.85	45.44	56.72	44.53
1 3/4	3.280	3.262	3.325	3.307	1 3/4	59.62	46.83	58.45	45.91
2	3.690	3.671	3.745	3.727	2	61.41	48.24	60.21	47.29
2 1/16	4.125	4.105	4.170	4.151	2 1/16	63.23	49.66	61.99	48.64
2 1/8	4.585	4.564	4.640	4.620	2 1/8	65.08	51.11	63.80	50.11
2 1/4	5.070	5.048	5.125	5.104	2 1/4	66.95	52.58	65.64	51.55
2 1/2	5.580	5.557	5.645	5.623	2 1/2	68.85	54.07	67.50	53.01
2 3/4	6.115	6.091	6.190	6.166	2 3/4	70.78	55.59	69.39	54.50
3	6.675	6.650	6.755	6.730	3	72.73	57.12	71.30	56.00
3 1/16	7.260	7.234	7.340	7.314	3 1/16	74.70	58.67	73.24	57.52
3 1/8	7.870	7.843	7.950	7.923	3 1/8	76.71	60.25	75.21	59.07
3 1/4	8.505	8.477	8.590	8.562	3 1/4	78.74	61.84	77.20	60.63
3 1/2	9.165	9.136	9.270	9.241	3 1/2	80.81	63.46	79.22	62.22
3 3/4	9.850	9.819	9.950	9.919	3 3/4	82.89	65.10	81.26	63.82
4	10.560	10.528	10.670	10.638	4	85.00	66.76	83.33	65.45
4 1/16	11.295	11.262	11.390	11.357	4 1/16	87.14	68.44	85.43	67.10
4 1/8	12.055	12.021	12.170	12.136	4 1/8	89.30	70.14	87.55	68.76
4 1/4	12.840	12.805	12.950	12.915	4 1/4	91.49	71.86	89.70	70.45
4 1/2	13.650	13.614	13.760	13.724	4 1/2	93.72	73.60	91.88	72.16
4 3/4	14.485	14.448	14.600	14.562	4 3/4	95.96	75.37	94.07	73.89
5	15.345	15.307	15.470	15.431	5	98.23	77.15	96.30	75.64
5 1/16	16.230	16.191	16.350	16.311	5 1/16	100.5	78.95	98.55	77.40
5 1/8	17.140	17.099	17.270	17.230	5 1/8	102.8	80.77	100.8	79.19
5 1/4	18.075	18.033	18.190	18.149	5 1/4	105.2	82.62	103.1	81.00
5 1/2	19.035	18.992	19.170	19.129	5 1/2	107.6	84.49	105.5	82.83
5 3/4	20.020	19.976	20.170	20.127	5 3/4	110.0	86.38	107.8	84.69
6	21.030	20.985	21.180	21.136	6	112.4	88.24	110.2	86.54
6 1/16	22.065	22.019	22.220	22.175	6 1/16	114.9	90.22	112.6	88.45
6 1/8	23.125	23.078	23.280	23.234	6 1/8	117.4	92.17	115.1	90.36
6 1/4	24.210	24.162	24.390	24.343	6 1/4	119.9	94.14	117.5	92.27
6 1/2	25.320	25.271	25.500	25.452	6 1/2	122.4	96.14	120.0	94.25



## BASIS OF CALCULATION :

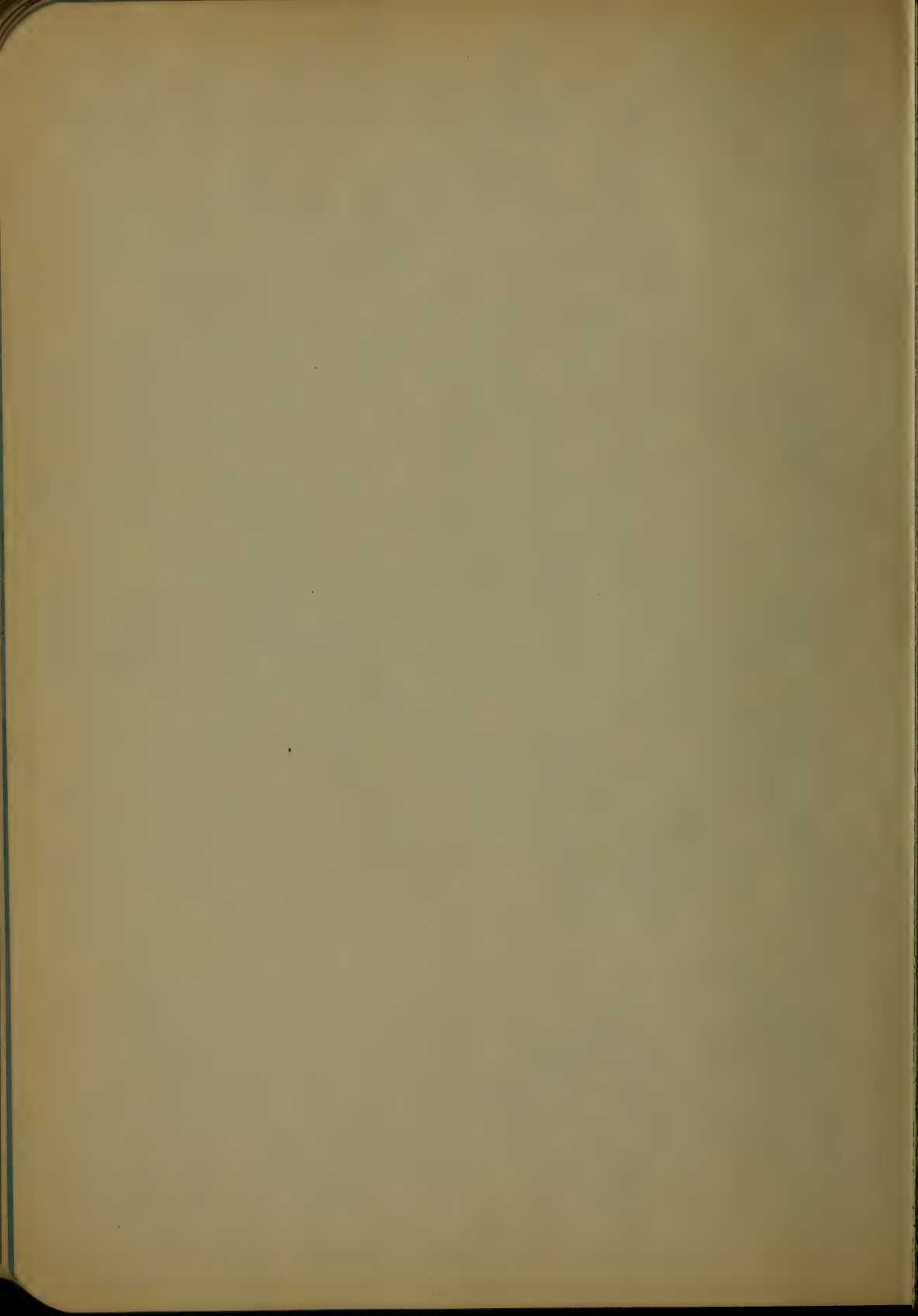
FOR STEEL... 489.6 POUNDS PER CUBIC FOOT.

IRON..... 480.0 " " " " " "

SIDE OF SQUARE OR DIAMETER, ADVANCING BY  $\frac{1}{16}$  TO 12 INCHES.

SIZE IN INCHES	STEEL.		IRON.		SIZE IN INCHES	STEEL.		IRON.	
	■	●	■	●		■	●	■	●
6	$\frac{1}{16}$	125.0	98.14	122.6	$\frac{1}{8}$	279.3	215.3	273.9	215.2
	$\frac{1}{8}$	127.6	100.14	125.1	$\frac{1}{8}$	283.2	220.4	277.8	218.3
	$\frac{3}{16}$	130.2	102.2	127.7	$\frac{3}{16}$	287.0	225.4	281.7	222.4
	$\frac{1}{4}$	132.8	104.3	130.2	$\frac{1}{4}$	290.9	228.5	285.2	224.0
	$\frac{5}{16}$	135.5	106.4	132.8	$\frac{5}{16}$	294.9	231.5	289.1	227.1
	$\frac{3}{8}$	138.2	108.5	135.5	$\frac{3}{8}$	298.9	234.7	293.1	230.2
	$\frac{7}{16}$	140.9	110.7	138.1	$\frac{7}{16}$	302.8	237.9	297.1	233.3
	$\frac{1}{2}$	143.6	112.8	140.8	$\frac{1}{2}$	306.8	241.0	300.8	236.5
	$\frac{9}{16}$	146.5	114.9	143.4	$\frac{9}{16}$	310.9	244.2	304.7	239.6
	$\frac{5}{8}$	149.2	117.2	146.3	$\frac{5}{8}$	315.0	247.4	308.6	242.6
	$\frac{11}{16}$	152.1	119.4	148.9	$\frac{11}{16}$	319.1	250.6	312.5	245.7
	$\frac{3}{4}$	154.9	121.7	151.9	$\frac{3}{4}$	323.2	253.9	316.4	248.9
	$\frac{7}{8}$	157.8	123.9	154.5	$\frac{7}{8}$	327.4	257.1	320.5	252.0
	$\frac{15}{16}$	160.8	126.2	157.6	$\frac{15}{16}$	331.6	260.4	324.7	255.1
	$\frac{15}{16}$	163.6	128.5	160.2	$\frac{15}{16}$	335.8	263.7	328.6	258.9
7	$\frac{1}{16}$	166.6	130.9	163.3	10	$\frac{1}{16}$	340.0	267.0	333.3
	$\frac{1}{8}$	169.6	133.2	165.9		$\frac{1}{8}$	344.3	270.4	337.7
	$\frac{3}{16}$	172.6	135.6	169.2		$\frac{3}{16}$	348.5	273.8	342.1
	$\frac{1}{4}$	175.6	137.9	171.8		$\frac{1}{4}$	352.9	277.1	346.5
	$\frac{5}{16}$	178.7	140.4	175.2		$\frac{5}{16}$	357.2	280.6	350.9
	$\frac{3}{8}$	181.8	142.8	177.8		$\frac{3}{8}$	361.6	284.0	355.4
	$\frac{7}{16}$	184.9	145.3	181.3		$\frac{7}{16}$	366.0	287.4	359.8
	$\frac{1}{2}$	188.1	147.7	183.8		$\frac{1}{2}$	370.4	290.9	364.3
	$\frac{9}{16}$	191.3	150.2	187.5		$\frac{9}{16}$	374.9	294.4	368.8
	$\frac{5}{8}$	194.4	152.7	190.1		$\frac{5}{8}$	379.4	297.9	373.2
	$\frac{11}{16}$	197.7	155.2	193.8		$\frac{11}{16}$	383.8	301.4	377.6
	$\frac{3}{4}$	200.9	157.8	196.4		$\frac{3}{4}$	388.3	305.0	382.1
	$\frac{7}{8}$	204.2	160.3	200.2		$\frac{7}{8}$	392.8	308.6	386.5
	$\frac{15}{16}$	207.6	163.0	202.8		$\frac{15}{16}$	397.3	312.2	390.9
	$\frac{15}{16}$	210.8	165.6	206.7		$\frac{15}{16}$	401.7	315.8	395.3
8	$\frac{1}{16}$	214.2	168.2	209.3	11	$\frac{1}{16}$	406.2	319.3	399.8
	$\frac{1}{8}$	217.6	171.0	213.3		$\frac{1}{8}$	411.4	323.1	404.3
	$\frac{3}{16}$	221.0	173.6	217.9		$\frac{3}{16}$	416.1	326.8	408.8
	$\frac{1}{4}$	224.0	176.3	221.7		$\frac{1}{4}$	420.9	330.5	413.1
	$\frac{5}{16}$	227.4	179.0	224.3		$\frac{5}{16}$	425.5	334.3	417.5
	$\frac{3}{8}$	230.9	181.8	226.9		$\frac{3}{8}$	430.3	337.9	421.9
	$\frac{7}{16}$	234.5	184.5	229.5		$\frac{7}{16}$	435.1	341.7	426.7
	$\frac{1}{2}$	238.0	187.3	233.5		$\frac{1}{2}$	439.9	345.5	431.5
	$\frac{9}{16}$	241.6	190.1	237.4		$\frac{9}{16}$	444.8	349.4	436.4
	$\frac{5}{8}$	245.3	193.0	240.3		$\frac{5}{8}$	449.6	353.1	440.8
	$\frac{11}{16}$	248.9	195.7	243.5		$\frac{11}{16}$	454.5	357.0	445.6
	$\frac{3}{4}$	252.6	198.7	246.8		$\frac{3}{4}$	459.3	360.9	450.4
	$\frac{7}{8}$	256.5	201.6	250.1		$\frac{7}{8}$	464.4	364.8	455.3
	$\frac{15}{16}$	260.3	204.4	253.2		$\frac{15}{16}$	469.4	368.6	460.2
	$\frac{15}{16}$	264.1	207.3	256.8		$\frac{15}{16}$	474.5	372.6	465.0
9	$\frac{1}{16}$	267.9	210.3	260.6	12	$\frac{1}{16}$	479.6	376.6	469.8
	$\frac{1}{8}$	271.6	213.3	264.3		$\frac{1}{8}$	484.6	380.6	474.6
	$\frac{1}{8}$	275.4	216.3	270.0		$\frac{1}{8}$	489.6	384.5	480.0







## WEIGHTS OF FLAT ROLLED STEEL BARS

WEIGHTS IN LBS. PER LINEAL FOOT.

WIDTH INCHES	THICKNES IN INCHES.												
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	
1	1/16	.106	.212	.319	.425	.531	.638	.744	.850	.956	1.06	1.17	1.28
1	1/4	.159	.319	.478	.638	.797	.956	1.12	1.28	1.43	1.59	1.75	1.91
	1/2	.208	.425	.638	.850	1.06	1.28	1.49	1.70	1.92	2.12	2.34	2.55
	3/4	.263	.525	.797	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.19
2	1/16	.333	.638	.957	1.23	1.59	1.92	2.23	2.55	2.87	3.19	3.51	3.83
	1/4	.399	.743	1.11	1.44	1.86	2.23	2.60	2.98	3.35	3.72	4.09	4.47
	1/2	.444	.850	1.28	1.70	2.12	2.55	2.98	3.40	3.83	4.25	4.67	5.10
2	3/4	.499	.956	1.44	1.91	2.39	2.87	3.35	3.83	4.30	4.78	5.26	5.75
	1/16	.565	1.06	1.59	2.12	2.65	3.19	3.72	4.25	4.78	5.31	5.84	6.38
	1/4	.611	1.17	1.75	2.34	2.92	3.51	4.09	4.67	5.26	5.84	6.43	7.02
3	1/2	.666	1.38	1.91	2.55	3.19	3.83	4.46	5.10	5.74	6.38	7.02	7.65
	3/4	.722	1.48	2.07	2.76	3.45	4.15	4.83	5.53	6.22	6.91	7.60	8.29
	1/16	.777	1.58	2.23	2.98	3.72	4.47	5.20	5.95	6.70	7.44	8.18	8.93
3	1/4	.833	1.69	2.39	3.19	3.99	4.78	5.58	6.38	7.17	7.97	8.76	9.57
	1/2	.888	1.77	2.55	3.40	4.25	5.10	5.95	6.80	7.65	8.50	9.35	10.20
	3/4	.944	1.81	2.71	3.61	4.52	5.42	6.32	7.22	8.13	9.03	9.93	10.84
4	1/16	.999	1.91	2.87	3.83	4.78	5.74	6.70	7.65	8.61	9.57	10.52	11.48
	1/4	1.05	2.02	3.03	4.09	5.05	6.06	7.07	8.08	9.09	10.10	11.11	12.12
	1/2	1.11	2.13	3.19	4.25	5.31	6.38	7.44	8.50	9.57	10.63	11.69	12.75
4	3/4	1.17	2.23	3.35	4.46	5.58	6.69	7.81	8.93	10.04	11.16	12.27	13.39
	1/16	1.22	2.33	3.51	4.67	5.84	7.02	8.18	9.35	10.52	11.69	12.85	14.03
	1/4	1.28	2.44	3.67	4.86	6.11	7.34	8.56	9.77	11.00	12.22	13.44	14.67
5	1/2	1.33	2.55	3.83	5.10	6.38	7.65	8.93	10.20	11.48	12.75	14.03	15.30
	3/4	1.39	2.66	3.99	5.31	6.64	7.97	9.29	10.63	11.95	13.28	14.61	15.94
	1/16	1.44	2.76	4.14	5.53	6.90	8.29	9.67	11.05	12.43	13.81	15.20	16.58
5	1/4	1.49	2.87	4.30	5.74	7.17	8.61	10.04	11.48	12.91	14.34	15.78	17.22
	1/2	1.55	2.98	4.46	5.95	7.44	8.93	10.41	11.90	13.39	14.87	16.36	17.85
	3/4	1.61	3.08	4.62	6.16	7.70	9.25	10.78	12.32	13.86	15.40	16.94	18.49
6	1/16	1.67	3.19	4.78	6.36	7.97	9.57	11.16	12.75	14.34	15.94	17.53	19.13
	1/4	1.72	3.29	4.94	6.58	8.23	9.88	11.53	13.18	14.82	16.47	18.12	19.77
	1/2	1.78	3.40	5.10	6.80	8.50	10.20	11.90	13.60	15.30	17.00	18.70	20.40
6	3/4	1.83	3.51	5.26	7.01	8.76	10.52	12.27	14.03	15.78	17.53	19.28	21.04
	1/16	1.89	3.61	5.42	7.22	9.03	10.84	12.64	14.44	16.26	18.06	19.86	21.68
	1/4	1.94	3.72	5.58	7.43	9.29	11.16	13.02	14.87	16.74	18.59	20.45	22.32
7	1/2	2.00	3.83	5.74	7.65	9.56	11.48	13.45	15.30	17.22	19.13	21.04	22.96
	3/4	2.05	3.93	5.90	7.86	9.83	11.80	13.76	15.73	17.69	19.65	21.62	23.59
	1/16	2.11	4.04	6.06	8.08	10.10	12.12	14.14	16.16	18.18	20.19	22.21	24.23
7	1/4	2.17	4.14	6.22	8.29	10.36	12.44	14.51	16.58	18.65	20.71	22.79	24.86
	1/2	2.22	4.25	6.38	8.50	10.62	12.75	14.88	17.00	19.11	21.25	23.38	25.50
	3/4	2.28	4.36	6.54	8.71	10.89	13.07	15.25	17.42	19.61	21.78	23.96	26.14
8	1/16	2.33	4.47	6.70	8.92	11.16	13.39	15.62	17.85	20.08	22.32	24.54	26.78
	1/4	2.39	4.56	6.86	9.14	11.42	13.71	15.99	18.28	20.56	22.85	25.13	27.42
	1/2	2.44	4.67	7.02	9.36	11.68	14.03	16.36	18.70	21.02	23.38	25.70	28.05
8	3/4	2.50	4.77	7.17	9.57	11.95	14.35	16.74	19.30	21.51	23.91	26.30	28.68
	1/16	2.55	4.87	7.32	9.78	12.22	14.68	17.12	19.55	22.00	24.44	26.88	29.33
	1/4	2.61	4.98	7.49	10.00	12.49	14.99	17.49	19.97	22.48	24.97	27.47	29.97
9	1/2	2.66	5.10	7.65	10.20	12.75	15.30	17.85	20.40	22.95	25.50	28.05	30.60
	3/4	2.72	5.21	7.82	10.42	13.01	15.65	18.23	20.82	23.43	26.03	28.64	31.25
	1/16	2.77	5.32	7.98	10.63	13.28	15.94	18.60	21.25	23.90	26.56	29.22	31.88
9	1/4	2.83	5.43	8.13	10.84	13.55	16.26	18.97	21.67	24.39	27.09	29.80	32.52

TO FIND THE WEIGHT OF PLATE OF ANY WIDTH GREATER THAN 12"  
ADD TO THE WEIGHT OF ONE FOOT OR TO ITS MULTIPLE, THAT OF THE SURPLUS



THICKNESS OF BARS FROM  $\frac{1}{16}$ " TO 2". WIDTH OF BARS FROM  $\frac{1}{2}$ " TO  $12\frac{3}{4}$ "  
BASIS OF CALCULATION 489.6 LBS. PER CUB. FOOT.

WIDTH INCHES	THICKNESS IN INCHES											
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{15}{16}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2
1	$\frac{1}{16}$	1.38	1.44	1.59	1.70	1.91	2.12	2.34	2.55	2.76	2.97	3.19
	$\frac{1}{8}$	2.07	2.24	2.39	2.55	2.87	3.11	3.50	3.82	4.12	4.46	4.79
	$\frac{3}{16}$	2.76	2.98	3.19	3.40	3.83	4.25	4.67	5.10	5.52	5.95	6.38
	$\frac{1}{2}$	3.45	3.72	3.99	4.25	4.78	5.31	5.84	6.38	6.90	7.44	7.97
2	$\frac{3}{16}$	4.14	4.47	4.78	5.10	5.74	6.34	7.02	7.65	8.29	8.93	9.57
	$\frac{1}{2}$	4.84	5.20	5.58	5.95	6.70	7.44	8.18	8.93	9.67	10.42	11.15
	$\frac{3}{4}$	5.53	5.95	6.38	6.80	7.65	8.50	9.35	10.20	11.05	11.90	12.75
	1	6.21	6.69	7.18	7.65	8.61	9.57	10.52	11.48	12.43	13.40	14.34
3	$\frac{1}{2}$	6.90	7.44	7.97	8.50	9.57	10.63	11.69	12.75	13.81	14.88	15.94
	$\frac{3}{4}$	7.60	8.18	8.77	9.35	10.52	11.69	12.85	14.03	15.19	16.37	17.53
	1	8.29	8.93	9.57	10.20	11.48	12.75	14.03	15.30	16.58	17.85	19.13
	$1\frac{1}{8}$	8.98	9.67	10.36	11.05	12.43	13.81	15.20	16.58	17.96	19.34	20.72
4	$\frac{1}{2}$	9.67	10.41	11.15	11.90	13.39	14.87	16.36	17.85	19.34	20.83	22.31
	$\frac{3}{4}$	10.36	11.16	11.95	12.75	14.34	15.94	17.53	19.13	20.72	22.32	23.91
	1	11.05	11.90	12.75	13.60	15.30	17.00	18.70	20.40	22.10	23.80	25.50
	$1\frac{1}{8}$	11.74	12.65	13.55	14.45	16.26	18.06	19.87	21.68	23.48	25.29	27.10
5	$\frac{1}{2}$	12.43	13.39	14.34	15.30	17.22	19.13	21.04	22.95	24.87	26.78	28.69
	$\frac{3}{4}$	13.12	14.13	15.14	16.15	18.17	20.19	22.21	24.23	26.25	28.27	30.28
	1	13.81	14.87	15.94	17.00	19.13	21.25	23.38	25.50	27.63	29.75	31.87
	$1\frac{1}{8}$	14.50	15.62	16.74	17.85	20.08	22.32	24.54	26.78	29.01	31.24	33.47
6	$\frac{1}{2}$	15.19	16.36	17.53	18.70	21.04	23.38	25.71	28.05	30.39	32.73	35.06
	$\frac{3}{4}$	15.88	17.10	18.33	19.55	21.99	24.44	26.88	29.33	31.77	34.22	36.65
	1	16.58	17.85	19.13	20.40	22.95	25.50	28.05	30.60	33.15	35.70	38.25
	$1\frac{1}{8}$	17.27	18.60	19.92	21.25	23.91	26.56	29.22	31.88	34.53	37.19	39.85
7	$\frac{1}{2}$	17.95	19.34	20.72	22.10	24.87	27.62	30.39	33.15	35.91	38.68	41.44
	$\frac{3}{4}$	18.65	20.08	21.51	22.95	25.82	28.69	31.56	34.43	37.29	40.17	43.03
	1	19.34	20.83	22.32	23.80	26.78	29.75	32.72	35.70	38.67	41.65	44.63
	$1\frac{1}{8}$	20.03	21.57	23.11	24.65	27.73	30.81	33.89	36.96	40.03	43.14	46.22
8	$\frac{1}{2}$	20.72	22.32	23.91	25.50	28.68	31.88	35.06	38.24	41.44	44.63	47.82
	$\frac{3}{4}$	21.41	23.05	24.70	26.35	29.64	32.94	36.23	39.53	42.82	46.12	49.40
	1	22.10	23.84	25.58	27.22	30.60	34.00	37.40	40.80	44.20	47.60	51.00
	$1\frac{1}{8}$	22.79	24.55	26.30	28.05	31.86	35.06	38.27	41.48	44.68	47.89	51.09
9	$\frac{1}{2}$	23.48	25.30	27.10	28.90	32.52	36.12	39.74	43.35	46.96	50.58	54.20
	$\frac{3}{4}$	24.17	26.04	27.89	29.75	33.47	37.20	40.91	44.63	48.34	52.07	55.79
	1	24.86	26.78	28.69	30.60	34.43	38.26	42.08	45.90	49.73	53.56	57.38
	$1\frac{1}{8}$	25.55	27.52	29.49	31.45	35.38	39.31	43.25	47.18	51.10	55.04	58.97
10	$\frac{1}{2}$	26.24	28.26	30.28	32.30	36.34	40.37	44.41	48.45	52.49	56.53	60.56
	$\frac{3}{4}$	26.94	29.01	31.08	33.15	37.29	41.44	45.58	49.73	53.87	58.01	62.16
	1	27.62	29.75	31.88	34.00	38.25	42.50	46.75	51.00	55.25	59.50	63.75
	$1\frac{1}{8}$	28.32	30.50	32.67	34.85	39.21	43.56	47.92	52.28	56.63	60.99	65.35
11	$\frac{1}{2}$	29.00	31.24	33.48	35.70	40.17	44.63	49.08	53.55	58.02	62.48	66.94
	$\frac{3}{4}$	29.69	31.98	34.28	36.56	41.12	45.69	50.25	54.83	59.40	63.97	68.53
	1	30.40	32.72	35.06	37.40	42.08	46.76	51.42	56.10	60.78	65.45	70.12
	$1\frac{1}{8}$	31.08	33.47	35.86	38.25	43.04	47.82	52.59	57.37	62.16	66.93	71.72
12	$\frac{1}{2}$	31.76	34.21	36.66	39.10	44.00	48.88	53.76	58.65	63.54	68.43	73.31
	$\frac{3}{4}$	32.44	34.95	37.46	39.95	44.94	49.94	54.93	59.93	64.92	69.92	74.90
	1	33.15	35.70	38.25	40.80	45.90	51.00	56.10	61.20	66.30	71.40	76.50
	$1\frac{1}{8}$	33.83	36.44	39.05	41.65	46.86	52.06	57.27	62.48	67.68	72.89	78.09
12	$\frac{3}{4}$	34.53	37.19	39.89	42.50	47.82	53.12	58.44	63.75	69.06	74.38	79.69
	1	35.22	37.93	40.64	43.35	48.77	54.19	59.60	65.03	70.44	75.87	81.28

BAR:  $15\frac{1}{2} \times \frac{7}{8} = 3\frac{1}{2} \times \frac{7}{8} + 12 \times \frac{7}{8} = 10.41 + 35.70 = 46.11$  LBS.

PLATE:  $4' - 6\frac{1}{2} \times \frac{5}{8} = 4 \times 25.5 + 13.81 = 115.81$  LBS.







# WEIGHT OF HEXAGON AND OCTAGON IRON & STEEL BARS, AND SQUARE, ROUND AND HEXAGON COLD COM-PRESSED STEEL. PER LINEAL FOOT IN LBS.

SIZE BETW. FLATE.	IRON	STEEL	SIZE BETW. FLATES D.M.	COLD COMPRESSED STEEL			SIZES		
	●	●		■	●	●		■	●
1/16	.	.011	3/16	.	.095	.	1 13/16	.	8.78
1/8	.	.044	7/32	.	.130	.	1 15/16	.	10.03
3/16	.	.099	1/4	.213	.167	.195	2	13.64	10.69
1/4	.164	.177	9/32	.270	.	.23	2 1/16	.	11.15
5/16	.326	.277	5/16	.332	.260	.29	2 1/8	.	12.07
3/8	.368	.398	11/32	.	.320	.36	2 3/16	.	12.79
7/16	.501	.542	3/8	.479	.375	.43	2 1/4	17.25	13.49
1/2	.654	.708	13/32	.	.450	.50	2 5/16	.	14.0
9/16	.828	.896	7/16	.652	.511	.56	2 3/8	.	15.07
5/8	1.023	1.107	15/32	.	.586	.64	2 7/16	.	15.83
11/16		1.339	1/2	.85	.667	.725	2 1/2	21.26	16.68
3/4	1.473	1.594	17/32	.	.	.815	2 9/16	.	17.55
13/16		1.870	9/16	1.08	.845	.93	2 5/8	.	18.32
7/8	2.004	2.169	19/32	.	1.00	1.10	2 11/16	.	19.31
15/16		2.490	5/8	1.34	1.05	1.15	2 3/4	25.72	20.18
1	2.618	2.833	21/32	.	1.17	.	2 13/16	.	21.15
1/8	3.313	3.585	11/16	1.61	1.26	1.40	2 7/8	.	22.09
1/4	4.091	4.427	23/32	.	1.38	1.52	2 15/16	.	22.96
3/8	4.950	5.356	3/4	1.92	1.50	1.66	3	30.61	24.06
1/2	5.890	6.374	13/16	2.25	1.77	1.91	3 1/16	.	24.58
5/8	6.913	7.481	53/64	.	1.90	.	3 1/8	.	26.09
3/4	8.018	8.674	27/32	.	1.94	.	3 3/16	.	27.16
7/8	9.204	9.960	7/8	2.60	2.05	2.25	3 1/4	35.92	28.24
2	10.47	11.332	29/32	.	2.20	2.40	3 5/16	.	29.4
1/4	13.25	14.343	15/16	2.99	2.35	2.58	3 3/8	.	30.43
1/2	16.36	17.71	31/32	.	2.52	.	3 7/16	.	31.56
3/4	19.80	21.42	1	3.40	2.68	2.94	3 1/2	41.67	32.64
3	23.50	25.50	1 1/16	3.85	3.02	3.33	3 9/16	.	33.84
1/4	27.65	29.92	1 3/32	.	3.20	3.52	3 5/8	.	35.20
1/2	32.07	34.70	1 1/8	4.30	3.38	3.75	3 11/16	.	36.40
3/4	36.82	39.84	1 3/16	.	3.77	4.15	3 3/4	47.84	37.55
4	41.89	45.33	1 1/4	5.31	4.17	4.60	3 7/8	.	39.85
1/4	47.29	51.17	1 5/16	.	4.61	5.07	3 15/16	.	41.04
1/2	53.01	57.37	1 3/8	6.43	5.05	5.57	4	52.42	42.50
3/4	59.07	63.92	1 13/32	.	5.26	.	4 1/16	.	46.65
5	65.45	70.83	1 7/16	.	5.52	6.07	4 3/16	.	52.62
1/4	72.16	78.08	1 5/16	.	5.60	.	4 1/2	.	53.74
1/2	79.19	85.70	1 1/2	7.66	6.01	6.62	4 5/8	.	65.3
3/4	86.56	93.67	1 9/16	.	6.52	7.17	5	71.80	67.45
6	94.25	101.99	1 5/8	8.98	7.06	7.76	6		
8		181.32	1 11/16	.	7.61	8.37	8		
10		283.31	1 3/4	10.41	8.19	9.00	10		
12		407.97	1 7/8	.	9.39	10.32	12		

# WEIGHTS OF VARIOUS SHEET METALS.

PER SQUARE FOOT IN LBS.

THICKNESS INCHES.	WROUGHT IRON.	CAST IRON	STEEL.	COPPER.	ALUMINUM	BRASS.	LEAD.	ZINC.
1/16	2.53	2.34	2.55	2.89	.869	2.77	3.17	2.34
1/8	5.05	4.69	5.10	5.78	1.739	5.55	7.42	4.69
3/16	7.58	7.03	7.65	8.67	2.609	8.32	11.13	7.03
1/4	10.10	9.38	10.20	11.56	3.479	11.10	14.83	9.38
5/16	12.63	11.72	12.75	14.45	4.348	13.87	18.54	11.72
3/8	15.16	14.06	15.30	17.34	5.218	16.64	22.25	14.06
7/16	17.68	16.41	17.85	20.23	6.088	19.42	25.96	16.41
1/2	20.21	18.75	20.40	23.13	6.958	22.2	29.67	18.75
9/16	22.73	21.09	22.95	26.02	7.827	24.97	32.84	21.09
5/8	25.27	23.44	25.50	28.91	8.697	27.74	37.08	23.44
11/16	27.80	26.78	28.05	31.80	9.567	30.52	40.25	25.78
3/4	30.31	28.13	30.60	34.69	10.436	33.29	44.50	28.13
13/16	32.84	30.47	33.15	37.58	11.306	36.07	47.67	30.47
7/8	35.37	32.81	35.70	40.47	12.175	38.84	51.92	32.81
15/16	37.90	35.15	38.25	43.36	13.045	41.61	55.09	35.15
1	40.42	37.50	40.80	46.25	13.915	44.39	59.33	37.50

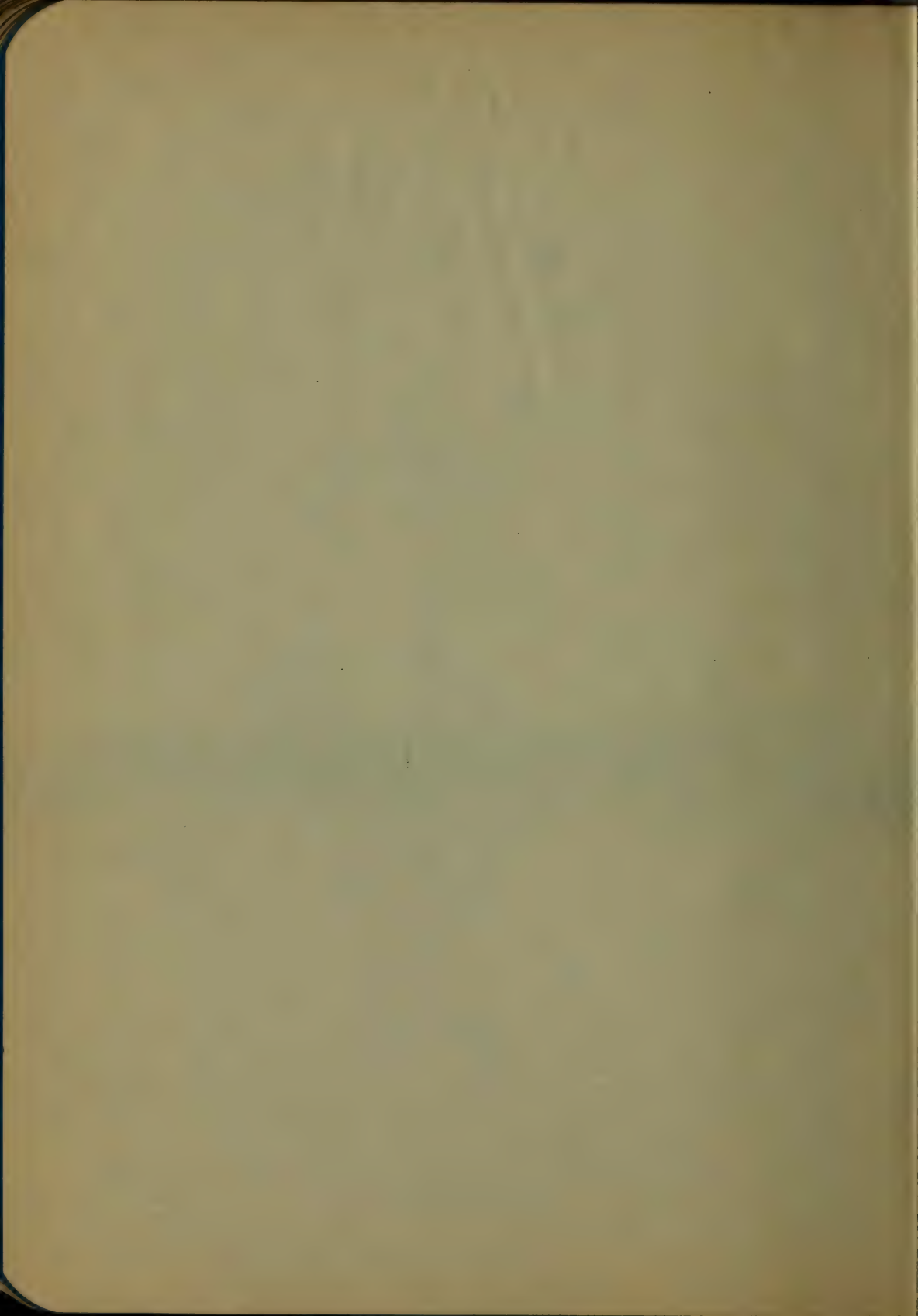
STANDARD PERFORATION OF SHEET METAL  $\frac{1}{4}$   $\frac{1}{2}$   $\frac{3}{4}$   $1$   $1\frac{1}{2}$   $2$   $2\frac{1}{2}$   $3$   $3\frac{1}{2}$   $4$   $5$   $6$   $8$   $10$   $12$   $14$   $16$  HOLES.

## DIMENSIONS OF MILL SHEARED STEEL PLATES. CAMBRIA STEEL CO.

WIDTH		THICKNESS		MAXIM. LENGTH	WIDTH		THICKNESS		MAXIM. LENGTH
INCHES	INCR. BY INCH.	INCHES	INCR. BY INCH.	FEET	INCHES	INCR. BY	INCHES	INCR. BY IN.	FEET.
6 to 8	1/8"	1/16	"	12	12 to 16	1/8"	1/16	"	8
"	"	3/32	"	18	"	"	3/32	"	15
"	"	1/8 & 5/32	"	20	"	"	1/8 to 3/4	1/32	20 to 8
8 to 12	"	1/16	"	10	16 to 20	"	3/32	"	12
"	"	3/32	"	15	"	"	1/8 to 3/4	1/32	20 to 6
"	"	1/8 & 5/32	"	20	20 to 28	"	1/8 to 3/4	"	20 to 4

MAXIMUM WEIGHT OF FINISHED PLATE NOT TO BE OVER 400 LBS.









1000 LINEAL FEET.

WEIGHTS OF  
IRON, STEEL, COPPER AND BRASS WIRE.

No. of GAUGE	AMERICAN OR BROWN & SHARPE GAUGE.				BIRM. G.		W & M. G.
	SIZE IN INCHES	IRON.	STEEL.	COPPER.	BRASS.	COPPER.	STEEL IN 63 LBS. BOX 216 FEET.
0000	.46000	560.74	566.03	640.51	605.18	623.925	154
000	.40964	444.68	448.33	507.95	479.91	546.76	181
00	.36480	352.66	355.99	402.83	380.97	437.107	217
0	.32486	279.67	282.30	319.45	301.82	349.928	228
1	.28930	221.79	223.89	253.34	239.35	272.435	276
2	.25768	175.89	177.55	200.91	189.82	244.15	343
3	.22942	139.48	140.80	159.32	150.52	202.965	399
4	.20431	110.62	111.66	126.35	119.38	171.465	470
5	.18194	87.780	88.548	100.20	94.666	146.51	555
6	.16202	69.565	70.221	79.462	75.075	124.742	647
7	.14428	55.165	55.685	63.013	59.545	98.076	750
8	.12849	43.751	44.164	49.976	47.219	82.41	905
9	.11443	34.699	35.026	39.636	37.437	66.305	1086
10	.10189	27.512	27.772	31.426	29.687	54.354	1304
11	.090742	21.820	22.026	24.924	23.549	43.59	1649
12	.082808	17.304	17.468	19.766	18.676	35.964	2158
13	.071961	13.722	13.851	15.674	14.809	27.319	2813
14	.064084	10.886	10.989	12.435	11.746	20.853	3728
15	.057058	8.631	8.712	9.859	9.315	15.692	4598
16	.050820	6.845	6.909	7.819	7.537	12.789	6000
17	.045257	5.427	5.478	6.199	5.857	10.18	8182
18	.040303	4.304	4.344	4.916	4.645	7.262	10862
19	.035890	3.413	3.445	3.899	3.684	5.340	14000
20	.031961	2.708	2.734	3.094	2.920	3.708	19687
21	.028462	2.147	2.167	2.452	2.317	3.099	23333
22	.025347	1.703	1.719	1.945	1.838	2.373	30000
23	.022571	1.350	1.363	1.542	1.457	1.892	36000
24	.020100	1.071	1.081	1.223	1.155	1.465	45000
25	.017900	.8491	.8571	.9699	.9163	1.211	54310
26	.015940	.6734	.6797	.7692	.7267	.9807	67742
27	.014195	.5340	.5391	.6099	.5763	.7749	75903
28	.012641	.4235	.4275	.4837	.4570	.5933	85135
29	.011257	.3358	.3389	.3835	.3624	.5116	133278
30	.010025	.2663	.2688	.3042	.2874	.4359	116666
31	.008928	.2113	.2132	.2413	.2280	.3027	126000
32	.007950	.1675	.1691	.1913	.1808	.2452	136956
33	.007080	.1328	.1341	.1517	.1434	.1937	170270
34	.006304	.1053	.1063	.1204	.1137	.1483	210000
35	.005614	.0837	.08445	.0956	.0915	.07568	252000
36	.005000	.06625	.06687	.0757	.0715	.04843	286343
37	.004453	.05255	.05304	.06003	.05671		
38	.003965	.04166	.04205	.04758	.04496		
39	.003531	.03305	.03336	.03755	.03566		
40	.003144	.02620	.02644	.02992	.02827		
WEIGHT OF A CUBIC INCH		.2778	.2833	.3146	.2972	WEIGHT OF A CUBIC INCH.	





# WIRE CLOTH & SCREENS.

OF  
IRON-STEEL-COPPER-BRASS AND BRONZE WIRE.

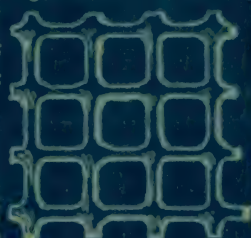
DOUBLE CRIMPED WIRE CLOTH.

SPACES 4 INCHES.  
OPENING.  
MESHES 12 PER INCH.



4 MESH. N° 12 WIRE.

GALVANIZED.



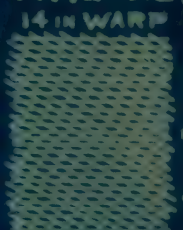
4 MESH. N° 18 WIRE.

ROLLED  
AFTER WOVEN.



8 MESH  
N° 16 WIRE.

TWILLED.



14 x 64 MESH  
PER INCH.

WASHBURN & MOEN  
BIRMINGHAM

IRON AND STEEL WIRE  
WIRE GAUGE IS USED FOR  
COPPER, BRASS & BRONZE

MESH PER INCH	IRON & STEEL.			COPPER-BRASS & BRONZE			MESH PER INCH.
	NUMBER OF WIRE	DECIMAL SIZE OF WIRE	SIZE OF OPENING	NUMBER OF WIRE.	DECIMAL SIZE OF WIRE	SIZE OF OPENING	
1	3 TO 15	.244 TO .072	.736 TO .928	.	.	.	1
3/4	4 TO 16	.225 ".063	.525 ".687	.	.	.	3/4
5/8	5 " 17	.207 ".054	.418 ".571	.	.	.	5/8
2	6 " 18	.192 ".047	.308 ".453	6 TO 18	.203 TO .049	.297 TO .451	2
2*	8	.162	.338	8	.165	.335	2*
2 1/2	8 TO 19	.162 TO .041	.238 TO .359	8 TO 19	.165 TO .04	.235 TO .368	2 1/2
2 1/2	9	.148	.252	9	.148	.252	2 1/2
3	9 TO 20	.148 TO .035	.185 TO .298	9 TO 20	.148 TO .035	.185 TO .298	3
3	10	.135	.198	10	.134	.199	3
3 1/2	10 TO 21	.135 TO .032	.151 TO .253	10 TO 20	.134 TO .035	.152 TO .251	3 1/2
3 1/2	11	.120	.165	11	.120	.166	3 1/2
4	11 TO 22	.120 TO .028	.130 TO .222	11 TO 21	.120 TO .035	.130 TO .218	4
4	11	.120	.130	11	.120	.130	4
4	12	.105	.145	12	.109	.141	4
4 1/2	12 TO 23	.105 TO .025	.117 TO .197	.	.	.	4 1/2
4 1/2	12	.105	.117	.	.	.	4 1/2
5	13 TO 24	.092 TO .023	.103 TO .177	13 TO 22	.095 TO .0295	.105 TO .170	5
6	14 TO 25	.080 ".020	.087 ".147	14 TO 23	.083 ".027	.082 ".140	6
7	15 TO 26	.072 ".018	.071 ".125	15 TO 24	.078 ".025	.071 ".118	7
8	16 " 27	.063 ".017	.062 ".108	16 TO 25	.065 ".023	.06 ".102	8
9	17 " 28	.054 ".016	.057 ".095	16, 17 TO 26	.065 ".0205	.046 ".091	9
10	17 " 29	.054 ".015	.046 ".085	17 " 26	.058 ".0205	.042 ".08	10
10	18	.047	.053	18	.049	.051	10

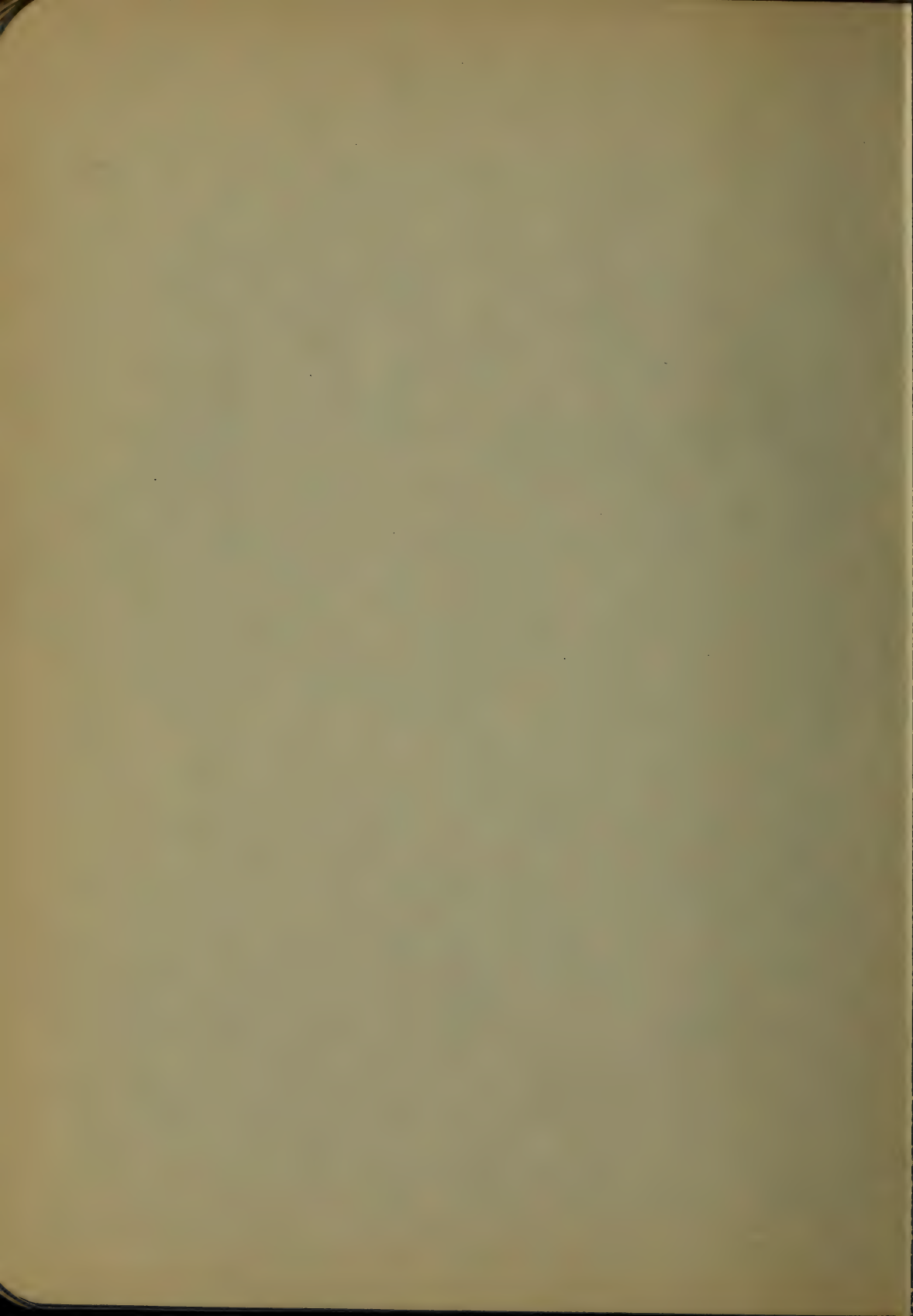
\*) STAR OR HEAVY NUMBERS OF WIRE STAND FOR MINING W. CLOTH.

STANDARD FULL ROLL: 100 FEET LONG AND 12" 18" 24" 30" &amp; 36" WIDE.

THICKNESS INCH.	IRON & STEEL.			COPPER-BRASS & BRONZE.			THICKNESS INCH.
	NUMBER WIRE	DECIMAL SIZE OF WIRE	SIZE OF OPENING	NUMBER WIRE	DECIMAL SIZE OF WIRE	SIZE OF OPENING	
12	18 to 30	.047 to .014	.036 to .069	18 to 27	.049 to .0167	.034 to .065	12
*12	19	.041	.042	18	.049	.034	*12
14	20 to 34	.035 to .01	.036 to .061	19	.040	.043	*12
*14	20	.035	.036	19 to 29	.04 to .0158	.031 to .056	14
16	21 to 35	.032 to .0095	.0305 to .053	19	.040	.031	*14
*16	22	.028	.034	20	.035	.036	*14
18	22 to 36	.028 to .009	.0275 to .046	20 to 30	.035 to .0137	.0275 to .048	16
*18	23	.025	.0305	20	.035	.0275	*16
20	23 to 36	.025 to .009	.025 to .041	21	.0315	.031	*16
*20	24	.023	.027	22 to 32	.0295 to .0113	.026 to .044	18
22	24 to 36	.023 to .009	.022 to .036	22	.0295	.026	*18
*22	24	.023	.022	23 to 34	.027 to .0095	.023 to .0405	20
*22	25	.02	.025	23	.027	.023	*20
24	25 to 36	.02 to .009	.021 to .032	24 to 35	.025 to .009	.0204 to .0364	22
*24	26	.02	.021	24	.025	.0204	*22
*24	26	.018	.023	25 to 36	.023 to .0075	.0186 to .0341	24
26	26 to 36	.018 to .009	.0205 to .0295	25	.023	.0186	*24
*26	26	.018	.0205	26 to 36	.0205 to .0075	.0179 to .0309	26
*26	27	.017	.0215	26	.0205	.0179	*26
28	27 to 36	.017 to .009	.0187 to .0267	27 to 36	.01875 to .0075	.0169 to .0262	28
*28	27	.017	.0187	27	.01875	.0169	*28
30	28 to 36	.016 to .009	.0173 to .0243	27 to 36	.01875 to .0075	.0145 to .0258	30
*30	28	.016	.0173	27	.01875	.0145	*30
35	29 to 36	.015 to .009	.0135 to .0195	28 to 36	.0165 to .0075	.012 to .021	35
*35	30	.014	.0145	28	.0165	.012	*35
40	31 to 37	.0135 to .008	.0115 to .0165	29	.0155	.0131	*35
*40	31	.0135	.0115	30 to 36	.0138 to .0075	.0112 to .0175	40
45	33 to 37	.011 to .0085		30	.01375	.0112	*40
*45	33	.011		31 to 36	.01225 to .0075		45
50	34 to 38	.01 to .008		31	.01225		*45
*50	34	.01		32 to 36	.01125 to .0075		50
55	35 to 38	.0095 to .008		32	.01125		*50
*55	35	.0095		33 to 37	.009 to .0065		60
60	35 to 39	.0095 to .0075		35	.009		*60
*60	35	.0095		37	.0065		70
64	37 to 39	.0085 to .0075		37	.0065		*70
70	37 to 39	" " "		38	.00575		80
*70	37	.0085		38	.00575		*80
74	39 to 40	.0075 to .0073		39	.005		90
80	40 to 41	.00725 to .07		39	.005		*90
*80	40	.00725		40	.0045		100
90	42	.00675					
*90							

\*) STAR DENOTES USUAL SIZE FOR MINING PURPOSES.







**ROLLED CLOTH** IS USED IN BRICK & CEMENT MANUFACTURE TO PROVIDE SHARP CORNERS AND FLAT SURFACES AGAINST STICKY MATERIALS AS CLAY AND WETT LIME ETC. FULL ROLL MEASURES UP TO 4 FEET WIDE AND 15 FEET LONG.

**TWILLED CLOTH** IS USED IN FILTERS, CENTRIFUGAL MACHINES, SUGAR REFINERIES ETC. USUALLY OF BRASS OR BRONZE WIRE MESHES ARE FROM 10 TO 20 WIRES IN THE WARP AND 60 TO 130 WIRES IN THE SHUTE.

**MILL SCREEN CLOTH** MADE OF TINNED STEEL TO PREVENT RUST  
USUALLY MESHES 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, ..., 36, 40, 45, 50  
WIRES 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, ..., 36, 36, 36, 36  
STAND. ROLL: 100 FEET LONG, 24, 26, 28, 30, 32, 34, 36 & 40 INCHES WIDE.

**BRANDUSTER CLOTH** WITH BLACK VARNISH TO PREVENT RUST  
USUALLY MESHES 30, 35, 40, 45, 50, 55, 60, 64, 70, 74, 80 & 100 INCH.  
WIRES 30, 32, 33, 34, 35, 35, 36, 37, 38, 39, 40 GAUGE.  
STAND. ROLL: 100 FEET LONG AND 14, 15, 16 AND 18 INCHES IN WIDTH.

**EXTRAFINE BRASS WIRE CLOTH** FOR TESTING OF ORES AND CHEMICALS MADE UP IN ROLLS FROM 5 TO 100 FEET LENGTH AND 24, 30 AND 36" WIDE.

USUALLY MESHES PLAIN 110, 120, 130, 140 TWILLED 110, 150, 160, 170, 180, 190, 200  
N° OF WIRE 42, 43, 44, 45, 41, ..., 44, 45, 45, 46, 46, 47

## DOUBLE CRIMED HEAVY WIRE SCREEN.

MADE OF IRON AND STEEL USED FOR GRADING OF CRUSHED ORES, COAL, STONE, SAND AND GRAVEL ETC. ARE MEASURED BY THE SPACE MADE BY THE WIRE. FULL ROLL IS 100 FEET LONG & HEAVY ROLLED STEEL CLOTH IS USED IN MALT KILN FLOORS FURNISHING A PERFECTLY SMOOTH SURFACE.

SPACE INCHES	ROD DIAM. INCHES FROM ADV. TO	SPACE INCHES	ROD DIAM. INCHES FROM TO
4"	1" $\frac{3}{4}$ ADV. BY $\frac{1}{16}$ " TO $\frac{3}{8}$ "	$\frac{7}{8}$ "	$\frac{5}{8}$ " DIMINISHING BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "
$3\frac{3}{4}$ "	1" $\frac{3}{4}$ ADV. BY $\frac{1}{16}$ " TO $\frac{5}{16}$ "	$\frac{7}{8}$ "	N° 4, 5, 6, 7 & 8 WIRE.
$3\frac{1}{2}$ "	1" $\frac{3}{4}$ " " " " $\frac{5}{16}$ "	$\frac{3}{4}$ "	$\frac{5}{8}$ " DIM. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "
$3\frac{1}{4}$ "	1" $\frac{3}{4}$ " " " " $\frac{5}{16}$ "	$\frac{3}{4}$ "	N° 4, 5, 6, 7, 8 & 9 WIRE.
3"	1" $\frac{3}{4}$ " " " " $\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{9}{16}$ " DIM. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "
$2\frac{3}{4}$ "	1" $\frac{3}{4}$ " " " " $\frac{1}{4}$ "	$\frac{3}{8}$ "	N° 4, 5, 6, 7, 8, 9 & 10 WIRE.
$2\frac{1}{2}$ "	1" $\frac{3}{4}$ " " " " $\frac{1}{4}$ "	$\frac{1}{2}$ "	$\frac{7}{16}$ " DIM. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "
$2\frac{1}{2}$ "	N° 4 WIRE.	$\frac{1}{2}$ "	N° 4, 5, 6, 7, 8, 9, 10 & 11 WIRE.
$2\frac{1}{4}$ "	1" $\frac{3}{4}$ ADV. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "	$\frac{7}{16}$ "	$\frac{5}{16}$ " & $\frac{1}{4}$ " ROD.
$2\frac{1}{4}$ "	N° 4 & 5 WIRE.	$\frac{7}{16}$ "	N° 1, 2, 4, 5, 6, 7, 8, 9, 10 & 11 WIRE
2"	1" $\frac{3}{4}$ ADV. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{5}{16}$ " & $\frac{1}{4}$ " ROD.
2"	N° 4, 5 & 6 WIRE.	$\frac{3}{8}$ "	N° 1, 2, 4, 5, 6, 7, 8, 9, 10, 11 & 12 WIRE
$1\frac{3}{4}$ "	1" $\frac{3}{4}$ ADV. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "	$\frac{5}{16}$ "	N° 4, 5, 6, 7, 8, 9, 10, 11 & 12 WIRE
$1\frac{3}{8}$ "	N° 4, 5 & 6 WIRE.	$\frac{1}{4}$ "	N° 6, 7, 8, 9, 10, 11, 12 & 13 "
$1\frac{1}{2}$ "	1" $\frac{3}{8}$ ADV. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "	$\frac{3}{16}$ "	N° 8, 9, 10, 11, 12, 13 & 14 "
$1\frac{1}{2}$ "	N° 4, 5, 6 & 7 WIRE.	$\frac{1}{8}$ "	N° 10, 11, 12, 13, 14, 15 & 16 "
$1\frac{1}{4}$ "	1" $\frac{3}{4}$ ADV. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "	2 & 2	N° 10 WIRE
$1\frac{1}{4}$ "	N° 4, 5, 6 & 7 WIRE.	$2\frac{1}{2}$ & $2\frac{1}{2}$	" 10 $\frac{1}{2}$ " } FOR LOCOMOTIVE
1"	$\frac{3}{4}$ " ADV. BY $\frac{1}{16}$ " TO $\frac{1}{4}$ "	3	" 11 " } STACK NETTING
1"	N° 4, 5, 6, 7 AND 8 WIRE	4	" 12 $\frac{1}{2}$ "







## RIVETS.

## DIMENSIONS OF RIVET HEADS.



D = DIAMETER.

DIMENSIONS IN INCHES.

F = FILLET.

I.

II.

III.

D	F	S	R	H	H'	H''	S	H	S'	S'	H	H''
1/4		15/32	1/4	5/32	5/32		15/32	2/32	1/4	5/8	1/8	1/16
5/16		21/32	11/32	7/32	7/32	1/16	21/32	5/16	3/8	11/16	3/16	1/32
3/8	1/16	2	7/16	3/8	5/8	1/8	2	7/16	1/2	7/8	1/4	1/8
7/16	3/32	1/16	17/32	7/16	7/16	1/8	1/16	9/16	5/8	1/8	5/16	5/16
1/2	3/32	1/4	21/32	1/2	1/2	3/16	1/4	11/16	3/4	1/3	3/8	1/16
5/8	1/8	1/2	5/4	5/8	11/16	1/4	1/2	13/16	7/8	1/2	7/16	1/32
3/4	1/8	11/16	7/8	11/16	3/4	1/4	11/16	15/16	1	1/4	1/2	1/16
7/8	5/32	1/8	1	13/16	27/32	1/2	1/8	1	1/8	2	3/16	1/32
1	3/16	2 1/8	1 3/32	15/16	31/32	5/16	2 1/8	1 1/16	1 1/4	2 1/4	5/8	1/16

## RIVET SPACING IN PLATES.

## LAP JOINT.

## SINGLE-RIVETED JOINT.

## DOUBLE-RIVETED JOINT.



FIG. 1.



FIG. 2.

T = THICKNESS OF PLATE.  
P = PITCH OF RIVETS.

# MINIMUM SPACING SINGLE - DOUBLE - & CHAIN - RIVETED LAP JOINT.

FIG. 1.

FIG. 2.

FIG. 3.

D	P	E	LAP	P'	P''	C	E	LAP	P'''	C'	E	LAP	T
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{3}{4}$	$2\frac{5}{16}$	$\frac{1}{16}$	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	1	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{3}{16}$
$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{1}{8}$	$2\frac{3}{16}$	$\frac{1}{4}$	$\frac{13}{16}$	$\frac{3}{16}$	$\frac{15}{16}$	$\frac{1}{2}$	$\frac{15}{16}$	$\frac{3}{16}$	$\frac{1}{16}$	$\frac{1}{4}$
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$2\frac{13}{16}$	$\frac{5}{8}$	$\frac{15}{16}$	$\frac{3}{4}$	$2\frac{7}{16}$	2	$\frac{17}{16}$	$\frac{3}{4}$	$\frac{11}{16}$	$\frac{5}{16}$
$\frac{5}{8}$	$\frac{1}{8}$	$\frac{15}{16}$	$\frac{1}{8}$	$3\frac{1}{16}$	$\frac{13}{16}$	$\frac{1}{16}$	$\frac{15}{16}$	$2\frac{15}{16}$	$2\frac{1}{2}$	$\frac{17}{16}$	$\frac{15}{16}$	$\frac{3}{16}$	$\frac{3}{16}$
$\frac{3}{4}$	$2\frac{1}{4}$	$\frac{1}{8}$	$2\frac{1}{2}$	$3\frac{5}{16}$	2	$\frac{3}{16}$	$\frac{1}{8}$	$3\frac{3}{16}$	3	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{1}{2}$
$\frac{7}{8}$	$2\frac{5}{8}$	$\frac{1}{16}$	$2\frac{5}{8}$	$3\frac{3}{16}$	$2\frac{7}{16}$	$\frac{5}{16}$	$\frac{1}{16}$	$3\frac{15}{16}$	$3\frac{1}{2}$	$\frac{13}{16}$	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{1}{2}$
1	3	$\frac{1}{2}$	3	$3\frac{13}{16}$	$2\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$4\frac{7}{16}$	4	$2\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{5}{8}$
$\frac{1}{8}$	$3\frac{3}{8}$	$\frac{11}{16}$	$3\frac{3}{8}$	$4\frac{1}{16}$	$2\frac{9}{16}$	$\frac{11}{16}$	$\frac{1}{16}$	$4\frac{15}{16}$	$4\frac{1}{2}$	$2\frac{7}{16}$	$\frac{1}{16}$	$\frac{13}{16}$	$\frac{5}{8}$
$\frac{1}{4}$	$3\frac{1}{2}$	$\frac{7}{8}$	$3\frac{3}{4}$	$4\frac{5}{16}$	$2\frac{3}{4}$	$\frac{1}{16}$	$\frac{7}{8}$	$5\frac{7}{16}$	5	$2\frac{11}{16}$	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{3}{4}$

## MINIMUM SPACING

CHAIN-RIVETED JOINT.

SINGLE &amp; DOUBLE RIV. BUTT JOINT.



D	T	T'	FIG. 4.	FIG. 5.	FIG. 6.
$\frac{1}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$1\frac{1}{2}$	2	2
$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{16}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{3}{8}$
$\frac{1}{2}$	$\frac{5}{16}$	$\frac{1}{4}$	3	3	4
$\frac{5}{8}$	$\frac{3}{8}$	$\frac{5}{16}$	$3\frac{1}{4}$	4	5
$\frac{3}{4}$	$\frac{7}{16}$	$\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	6
$\frac{7}{8}$	$\frac{1}{2}$	$\frac{7}{16}$	5	$5\frac{1}{4}$	7
1	$\frac{9}{16}$	$\frac{1}{2}$	6	$5\frac{3}{8}$	8
$\frac{1}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	$6\frac{1}{2}$	6	9
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	7	$6\frac{1}{2}$	10

FIG. 3.

## BUTT JOINT.

SINGLE-RIVETED BUTT. DOUBLE-RIVETED BUTT.

SINGLE PLATE. DOUBLE PLATE.

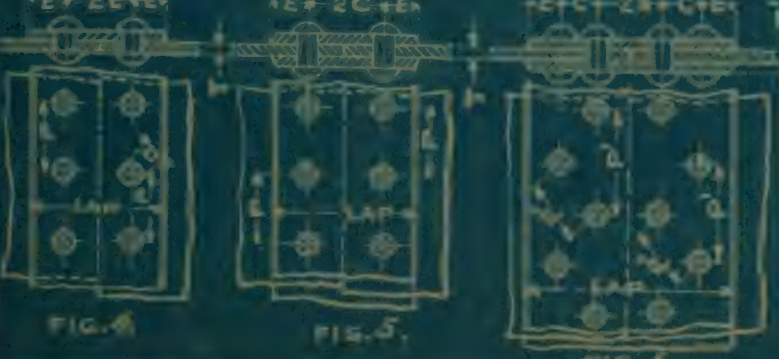


FIG. 4.

FIG. 5.

FIG. 6.

NOTE:


DIMENSIONS FOR P, P', P'', E AND C FOR BUTT JOINT ARE SAME AS FOR LAP JOINT.







# RIVET SPACING IN STANDARD I BEAMS, CHANNELS AND ANGLES. FLANGES AND CONNECTION ANGLES OF I BEAMS.

	I	W. LBS.	D	N	E'	Q	I	W. LBS.	D	N	E'	Q
	3	5.5	3/8	1 1/16	4 3/16	1/4	15	41.0	3/4	3	4 3/16	3/8
		7.5	"	"	4 3/8	"	"	60.0	"	"	4 1/8	1/2
	4	7.0	1/2	1 1/2	4 3/16	3/32	"	60.0	7/8	3 1/4	4 1/32	13/16
	"	10.3	"	"	4 7/16	5/16	"	80.0	"	"	5	2 1/32
	5	9.75	"	1 3/4	4 3/16	"	"	80.0	"	3 1/2	4 3/4	2 3/32
	"	14.75	"	"	4 3/8	11/32	"	80.0	"	3 3/4	4 1/16	1 1/32
	6	12.25	5/8	2	4 1/4	"	"	100.0	"	"	5 3/4	1 1/4
	"	17.25	"	"	4 1/2	3/4	18	55.0	"	3 1/4	4 1/2	1 1/16
	7	15.0	"	2 1/4	4 1/4	11/32	"	70.0	"	"	5 1/2	2 3/32
	"	20.0	"	"	4 1/2	3/8	20	65.0	"	3 1/2	5	2 3/32
	8	17.75	3/4	"	4 3/8	15/32	"	75.0	"	"	5 3/32	"
	"	25.25	"	"	4 1/2	7/16	"	80.0	"	"	4	2 3/32
	9	21.0	"	2 1/2	4 5/16	"	"	100.0	"	"	5 1/8	15/16
	"	35.0	"	"	4 3/4	15/32	24	80.0	"	"	5	2 1/32
	10	25.0	"	"	4 5/16	"	"	100.0	"	"	5 3/32	7/8
	"	25.0	"	2 5/8	"	"	"	"	"	"	"	"
	"	40.0	"	"	4 3/4	17/32	"	"	"	"	"	"
	12	31.5	"	2 3/4	4 3/8	"	"	"	"	"	"	"
	"	40.0	"	"	4 9/16	9/16	"	"	"	"	"	"
	"	40.0	"	3	4 3/8	17/32	"	"	"	"	"	"
	"	55.0	"	"	4 3/8	1/16	"	"	"	"	"	"

W = WEIGHT, LBS. PER FT. LBS.



## ANGLES FLANGES AND CONEC' ANG. OF CHANNELS

A	D	M	CH	W	D	M'	E'	CH	W	D	M'	E'
1/4	1/4	3/16	3	4.0	3/8	15/16	4 3/16	9	13.25	3/4	1 1/8	4 1/8
1/2	3/8	3/16	"	6.0	"	"	4 3/8	"	15.0	"	"	4 3/8
1 1/8	1/2	1/2	4	5.25	1/2	1	4 3/16	"	20.0	"	1 3/4	4 1/16
1 5/8	"	3/8	"	7.25	"	"	4 3/8	"	25.0	"	"	4 3/8
1 3/4	"	1/2	5	6.5	"	"	4 3/16	10	15.0	"	1 1/2	4 1/8
1 3/8	"	1/2	"	9.0	"	1 1/4	4 1/8	"	20.0	"	"	4 1/8
1 3/4	5/8	1/2	"	11.5	"	"	4 1/2	"	25.0	"	2	4 1/8
2	"	1 1/8	6	6.0	5/8	1 1/8	4 3/16	"	35.0	"	"	4 1/8
2 1/4	3/4	1 1/4	"	10.5	"	"	4 1/8	12	20.0	"	1 3/4	4 1/16
2 1/2	"	1 1/2	"	13.0	"	1 3/8	4 3/16	"	25.0	"	"	4 1/16
2 3/4	"	1 3/4	"	15.5	"	"	4 3/8	"	30.0	"	2	5 1/8
3	3/2	1 3/4	7	9.25	"	1 1/4	4 3/16	"	40.0	"	"	5 3/8
3 1/4	1	2	"	14.25	"	"	4 3/8	15	33.0	"	1 3/8	4 1/8
3 1/2	1	2 1/8	"	17.25	"	1 1/2	4 1/8	"	40.0	"	"	5 1/8
4	1	2 1/4	"	19.75	"	"	4 3/16	"	45.0	"	2 1/4	5 1/8
4 1/4	1	2 3/8	8	11.25	3/4	1 1/4	4 3/16	"	55.0	"	"	5 3/8
5	1	2 1/2	"	15.75	"	"	4 3/8	"	"	"	"	"
5 1/4	1	2 3/4	"	16.25	"	1 1/2	4 3/16	"	"	"	"	"
5 1/2	1	3	"	21.25	"	"	4 3/8	"	"	"	"	"



# VARIOUS GRIPS AND REQUIRED LENGTH TO FORM RIVET HEADS.

GRIP OF RIVET.	DIAMETER OF RIVETS INCHES.									
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	
	LENGTH OF RIVETS INCHES.									
	1/2	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	2 3/8
	5/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/8	2 1/4	2 3/4
	3/4	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2 1/8	2 1/4	2 3/8	2 3/4
	7/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4
	1	1 3/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4
	1 1/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4
	1 1/4	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 3/8	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 1/2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 3/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1/2	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	2 3/8
	5/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/8	2 1/4	2 3/4
	3/4	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2 1/8	2 1/4	2 3/8	2 3/4
	7/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4
	1	1 3/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4
	1 1/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4
	1 1/4	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 3/8	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 1/2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 3/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1/2	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	2 3/8
	5/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/8	2 1/4	2 3/4
	3/4	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2 1/8	2 1/4	2 3/8	2 3/4
	7/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4
	1	1 3/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4
	1 1/8	1 1/2	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4
	1 1/4	1 3/4	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 3/8	2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 1/2	2 1/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
	1 3/4	2 3/8	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4

FOR COUNTERSUNK RIVETS SUBTRACT FROM ABOVE DIMENSION

1/8	1/4	3/8	1/2	1/2	5/8	3/4	7/8	7/8	8
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## STANDARD WASHERS.

PUNCHED OF STEEL-WROUGHT IRON-BRASS AND COPPER SHEETS.



FOR BOLT	GAUGE	T	D	H	FOR BOLT	GAUGE	T	D	H
5/16	18	.049	5/16	1/4	1	9	.148	2 1/2	1 1/16
1/4	16	.065	3/4	5/16	1 1/8	9	.148	2 3/8	1 1/4
5/16	16	.065	7/8	3/8	1 1/4	9	.148	3	1 3/8
3/8	14	.083	1	7/16	1 3/8	8	.165	3 1/4	1 1/2
7/16	14	.083	1 1/4	1/2	1 1/2	8	.165	3 1/2	1 5/8
1/2	12	.09	1 3/8	9/16	1 5/8	8	.165	3 3/4	1 3/4
9/16	12	.09	1 1/2	5/8	1 3/4	8	.165	4	1 7/8
5/8	10	.134	1 3/4	11/16	1 7/8	8	.165	4 1/4	2
3/4	10	.134	2	13/16	2	8	.165	4 1/2	2 1/8
7/8	9	.148	2 1/4	15/16					

## STANDARD TAPER PINS.

MADE OF BESSEMER STEEL.

STANDARD TAPER  $\frac{1}{4}$ " TO A FOOT.

NUMBER	0	1	2	3	4	5	6	7	8	9	10
DIAM. AT LARGE END	.156	.172	.193	.219	.250	.289	.341	.409	.492	.591	.706
FRACTIONAL SIZE	$\frac{5}{32}$	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{9}{32}$	$\frac{11}{32}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{7}{8}$
LONGEST LIMIT OF L	1	1 1/4	1 1/2	1 3/4	2	2 1/4	3	3 3/4	4 1/2	5 1/2	6

LENGTH FROM  $\frac{3}{4}$ " TO 6" ADVANCING BY  $\frac{1}{4}$ " TO LIMIT.

## STANDARD TAPER PIN REAMERS.

DIMENSIONS IN INCHES.



NUMBER	0	1	2	3	4	5	6	7	8	9	10	11	12
DIAM. OF SMALL END	.125	.146	.162	.183	.208	.240	.279	.331	.398	.482	.591	.706	.842
LENGTH OF FLUTE	1 5/8	1 3/4	1 5/8	2 1/4	2 3/8	2 3/4	3 5/8	4 3/4	5 1/4	6 1/4	7	8 1/2	10
TOTAL LENGTH	2 1/4	2 1/2	3	3 1/4	4	4 1/2	5	6	6 3/4	8 1/4	9 1/2	11 1/2	13 1/2

STANDARD TAPER  $\frac{1}{4}$ " TO A FOOT.DIAM. OF SMALL END IS TAKEN  $\frac{3}{8}$ " FROM EXTREME END.REAMERS ARE ARRANGED TO OVERLAP  $\frac{3}{8}$ " THE NEXT SMALLER SIZE.



## MORSE TAPER REAMERS.

FOR FINISHING.

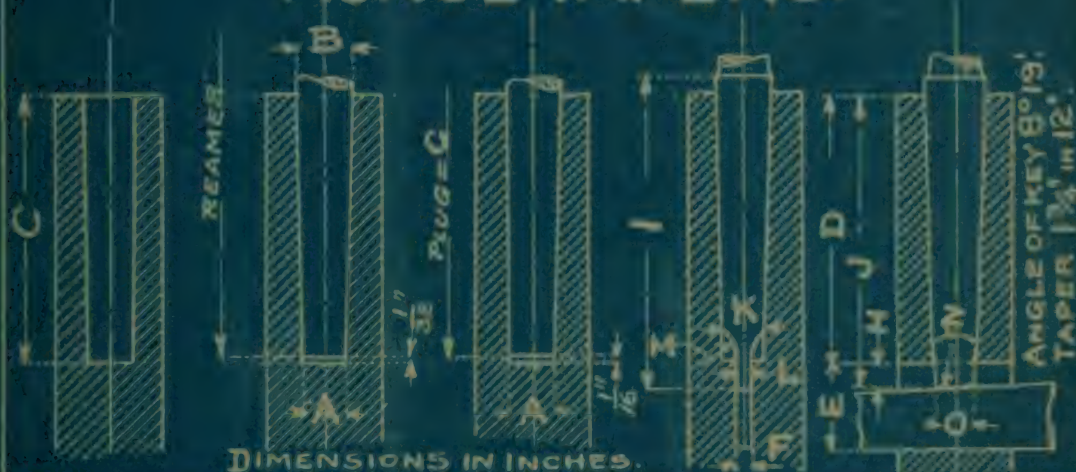
LENGTH OF FLUTE.

FOR ROUGHING.



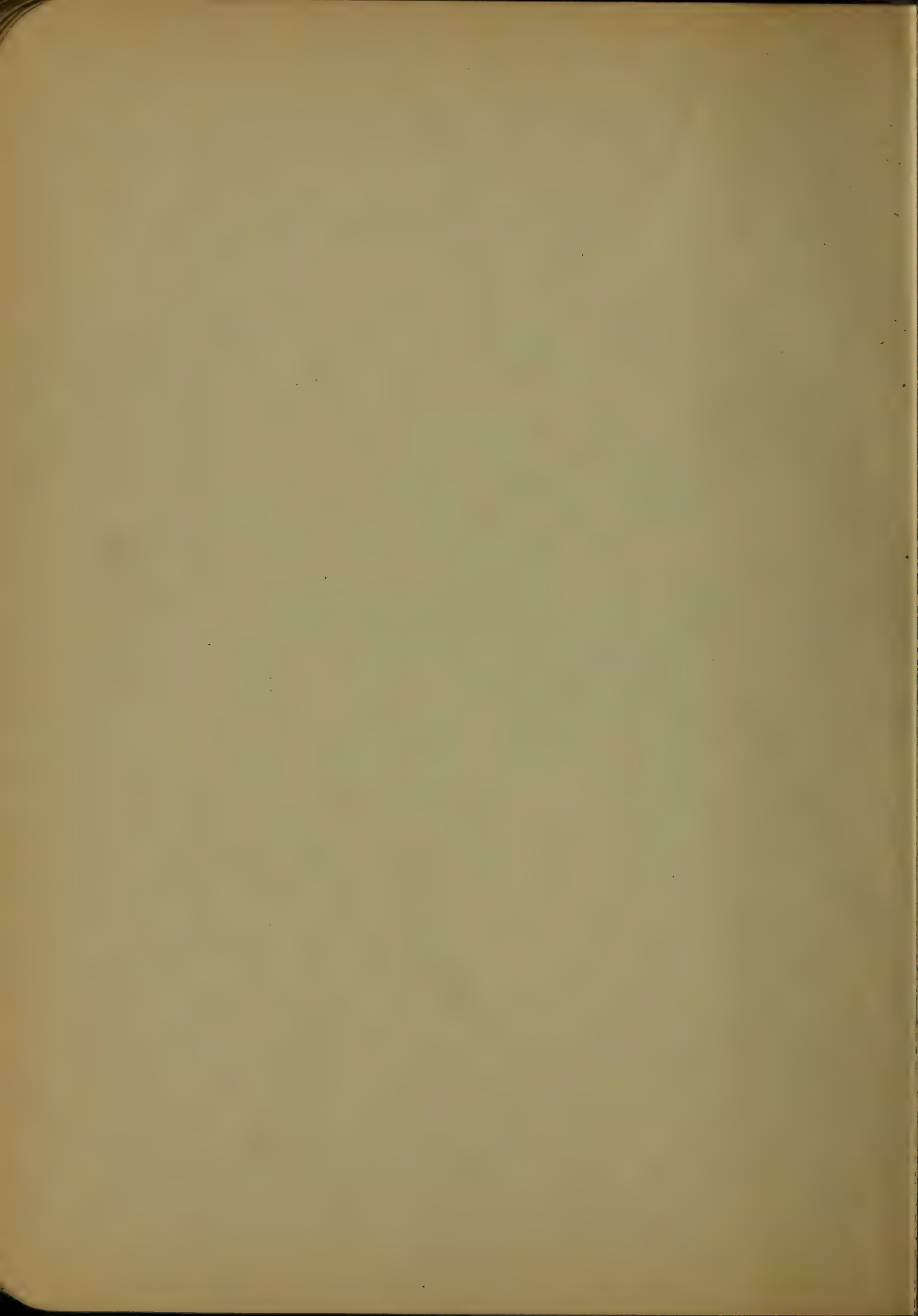
NUMBER OF REAMER	0	1	2	3	4	5	6	7
DIAMETER AT SMALL END	.258	.369	.572	.778	1.020	1.475	2.116	2.750
DIAMETER AT LARGE END	.375	.517	.7455	.989	1.290	1.801	2.557	3.373
LENGTH OF FLUTE, INCHES	2 1/4	3	3 1/2	4 1/4	5 1/4	6 1/4	8 1/2	12
FULL LENGTH, INCHES	3 3/8	5 1/2	7	8	9	10	12	16

## MORSE TAPERS.



DIMENSIONS IN INCHES.

NUMBER OF TAPER.	TAPER PER INCH.	TAPER PER FOOT.	DIAMETER OF PLUG AT SMALL END.	DIAMETER AT END OF SOCKET.	DEPTH OF HOLE	END OF SOCKET TO KEYWAY.	LENGTH OF KEYWAY.	WIDTH OF KEYWAY.	STANDARD PLUG DEPTH	LENGTH OF TONGUE.	WHOLE LENGTH OF SHANK.	SHANK DEPTH.	DIAMETER OF POINT OF SHANK.	THICKNESS OF TONGUE	RADIUS OF MILL FOR TONGUE.	RADIUS OF TONGUE.	WIDTH OF TONGUE.
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	.05	.600	.369	.475	2 1/2	2 1/2	3/4	.213	2 1/8	5/8	2 3/16	2 3/8	.356	1 3/4	3/16	.05	.35
2	.05016	.602	.572	.7	2 1/2	2 1/2	3/8	.26	2 1/8	3/8	3 1/16	2 3/8	.556	1/4	1/4	.06	1 1/2
3	.05016	.602	.778	.938	3 1/4	3 1/4	1 1/4	.322	3 3/8	7/8	3 3/4	3 3/8	.759	5/16	9/32	.08	3/4
4	.05191	.623	1.02	1.231	4 1/8	3 3/8	1 1/4	.476	4 1/8	1 1/2	4 3/8	4 1/2	.997	15/32	5/16	.10	3 1/2
5	.0528	.630	1.475	1.748	5 1/4	4 3/4	1 1/2	.635	5 3/8	5/8	5	5 1/4	1.446	5/8	3/8	.12	1 13/32
6	.05216	.626	2.116	2.494	7 3/8	7	1 3/4	.76	7 1/4	5/8	8 5/8	8	2.077	3/4	1/2	.15	2







# DIMENSIONS OF STANDARD MACHINE KEYS, FOR GIVEN SHAFT DIAMETERS.



D = DIAMETER OF SHAFT.

W = WIDTH OF KEY.

T = THICKNESS OF KEY.

CUT KEYWAY IN SHAFT AND KEYSEAT IN  
HUB OF WHEEL OR GEAR.

TAPER OF KEYS  $\frac{1}{8}$  IN ONE FOOT =  $+6^\circ$  OF ANGLE OF KEY.

D	W	T	D	W	T	D	W	T
$\frac{5}{16}$	.09375	.09375	2 $\frac{3}{16}$	.5	.4375	4	.8125	.75
$\frac{3}{8}$	.09375	.09375	$\frac{1}{4}$	.5	.4375	$\frac{1}{8}$	.8125	.75
$\frac{7}{16}$	.125	.125	$\frac{5}{16}$	.5	.4375	$\frac{1}{4}$	.875	.75
$\frac{1}{2}$	.125	.125	$\frac{3}{8}$	.5	.4375	$\frac{3}{8}$	.875	.75
$\frac{9}{16}$	.125	.125	$\frac{7}{16}$	.5	.4375	$\frac{1}{2}$	.9375	.8125
$\frac{5}{8}$	.1875	.1875	$\frac{1}{2}$	.5	.4375	$\frac{5}{8}$	.9375	.8125
$\frac{11}{16}$	.1875	.1875	$\frac{9}{16}$	.5625	.5	$\frac{3}{4}$	1.000	.875
$\frac{3}{4}$	.1875	.1875	$\frac{5}{8}$	.5625	.5	$\frac{7}{8}$	1.000	.875
$\frac{13}{16}$	.1875	.1875	$\frac{11}{16}$	.5625	.5			
$\frac{7}{8}$	.1875	.1875	$\frac{3}{4}$	.5625	.5	5	1.000	.875
$\frac{15}{16}$	.25	.25	$\frac{13}{16}$	.5625	.5	$\frac{1}{5}$	1.0625	.875
1	.25	.25	$\frac{7}{8}$	.5625	.5	$\frac{1}{4}$	1.0625	.875
$\frac{1}{16}$	.25	.25	$\frac{15}{16}$	.625	.5625	$\frac{3}{10}$	1.125	.9375
$\frac{1}{8}$	.25	.25	3	.625	.5625	$\frac{1}{2}$	1.125	.9375
$\frac{3}{16}$	.25	.25	$\frac{1}{4}$	.625	.5625	$\frac{5}{10}$	1.125	.9375
$\frac{1}{4}$	.3125	.3125	$\frac{1}{8}$	.625	.5625	$\frac{3}{4}$	1.125	.9375
$\frac{5}{16}$	.3125	.3125	$\frac{3}{16}$	.625	.5625	$\frac{7}{8}$	1.1875	1.000
$\frac{3}{8}$	.3125	.3125	$\frac{1}{4}$	.6875	.625	6	1.1875	1.000
$\frac{1}{2}$	.3125	.3125	$\frac{5}{16}$	.6875	.625	$\frac{1}{4}$	1.25	1.0625
$\frac{9}{16}$	.3125	.3125	$\frac{3}{8}$	.6875	.625	$\frac{1}{2}$	1.25	1.0625
$\frac{5}{8}$	.375	.375	$\frac{7}{16}$	.6875	.625	$\frac{3}{4}$	1.375	1.125
$\frac{11}{16}$	.375	.375	$\frac{1}{2}$	.6875	.625			
$\frac{3}{4}$	.375	.375	$\frac{9}{16}$	.75	.6875	7	1.375	1.125
$\frac{13}{16}$	.375	.375	$\frac{5}{8}$	.75	.6875	$\frac{3}{5}$	1.5	1.25
$\frac{7}{8}$	.375	.375	$\frac{11}{16}$	.75	.6875	$\frac{1}{2}$	1.5	1.25
$\frac{15}{16}$	.4375	.4375	$\frac{3}{4}$	.75	.6875	$\frac{3}{4}$	1.5	1.25
2	.4375	.4375	$\frac{13}{16}$	.75	.6875			
$\frac{1}{16}$	.4375	.4375	$\frac{7}{8}$	.75	.6875	8	1.75	1.5
$\frac{1}{8}$	.4375	.4375	$\frac{15}{16}$	.8125	.75	10	2.000	1.75

# MANUFACTURED SQUARE STEEL KEYS -N- AND FEATHER KEYS.



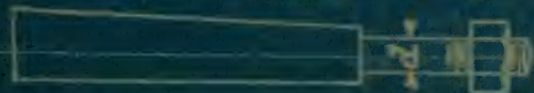
WITH HEAD.

WITHOUT HEAD.

TAPER FOR KEYS  $\frac{1}{8}$ ,  $\frac{3}{16}$ ,  $\frac{1}{4}$ ,  $\frac{5}{16}$  TO  $\frac{3}{8}$  IN 12 INCHES.

FEATHER KEYS ARE WITHOUT HEAD OR TAPER.

H	L	L <sub>1</sub>	M	N	H	L	L <sub>1</sub>	M	N
ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$	ADVANCING BY $\frac{1}{2}$
$\frac{1}{8}$	1" TO 5"	1" TO 4"	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{8}$	3½" TO 24"	4" TO 24"	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{3}{16}$	1" " 5"	1" " 5"	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{1}{16}$	3½" " 24"	4½" " 24"	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{1}{4}$	1" " 6"	1" " 6"	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{3}{16}$	4" " 24"	4½" " 24"	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{5}{16}$	1" " 7"	1" " 7"	$\frac{7}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	4" " 24"	4½" " 24"	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{3}{8}$	1" " 8½"	1" " 7"	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{8}$	4" " 24"	4½" " 24"	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{7}{16}$	1" " 9½"	1" " 8½"	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	4" " 24"	5" " 24"	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{2}$	1" " 11½"	1" " 10"	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{2}$	4½" " 24"	5" " 24"	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{5}{8}$	1" " 12½"	1" " 11½"	$\frac{7}{8}$	$\frac{11}{16}$	2	4½" " 24"	5" " 24"	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{3}{4}$	1" " 14½"	1" " 13"	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$	4½" " 24"	5" " 24"	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{11}{16}$	1" " 16"	2" " 14½"	$\frac{9}{16}$	$\frac{13}{16}$	$\frac{1}{8}$	4½" " 24"	5½" " 24"	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{3}{4}$	1½" " 18"	2" " 16"	$\frac{5}{8}$	1	$\frac{1}{4}$	5" " 24"	5½" " 24"	2	2
$\frac{15}{16}$	1½" " 20"	2½" " 18"	$\frac{11}{16}$	$\frac{1}{8}$	$\frac{3}{8}$	5" " 24"	5½" " 24"	2	2
$\frac{7}{8}$	2" " 20"	2½" " 20"	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	5" " 24"	6" " 24"	2	2
$\frac{15}{16}$	2" " 22"	2½" " 22"	$\frac{11}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	5" " 24"	6" " 24"	2	2
1	2½" " 24"	2½" " 24"	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	5½" " 24"	6" " 24"	2	2
$\frac{1}{16}$	2½" " 24"	3½" " 24"	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	5½" " 24"	6" " 24"	2	2
$\frac{1}{8}$	2½" " 24"	3½" " 24"	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	5½" " 24"	6" " 24"	2	2
$\frac{3}{16}$	2½" " 24"	3½" " 24"	$\frac{7}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	5½" " 24"	6" " 24"	2	2
$\frac{1}{4}$	3" " 24"	3½" " 24"	$\frac{7}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	6" " 24"	6½" " 24"	2	2
$\frac{5}{16}$	3" " 24"	4" " 24"	1	$\frac{1}{4}$	$\frac{1}{2}$	6" " 24"	6½" " 24"	2	2
$\frac{3}{8}$	3" " 24"	4" " 24"	1	$\frac{1}{4}$	$\frac{1}{2}$	6" " 24"	6½" " 24"	2	2
$\frac{7}{16}$	3" " 24"	4" " 24"	1	$\frac{1}{4}$	$\frac{1}{2}$	6" " 24"	6½" " 24"	2	2
$\frac{1}{2}$	3½" " 24"	4" " 24"	1	$\frac{1}{4}$	$\frac{1}{2}$	6" " 24"	6½" " 24"	2	2
$\frac{3}{4}$	3½" " 24"	4" " 24"	1	$\frac{1}{4}$	$\frac{1}{2}$	6" " 24"	6½" " 24"	2	2
					3	6" " 24"	6½" " 24"	2	2

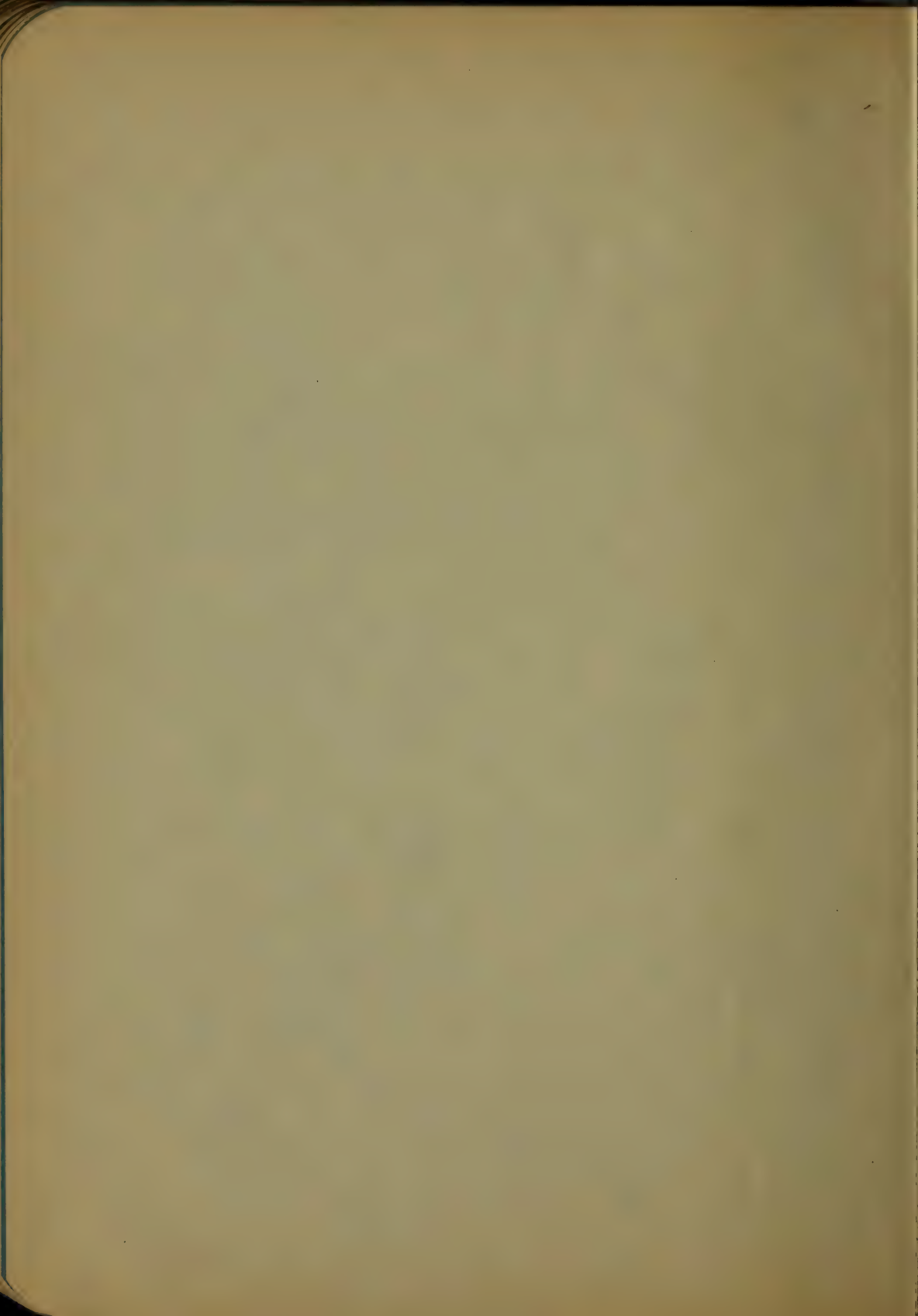
SCREW DIAMETER  $d = H - \frac{1}{2}$  TAPER; TIT DIAM.  $= d_1 = H - \frac{1}{32}$ 

KEY WITH SCREW ADJUSTMENT.



FEATHER KEY WITH TIT

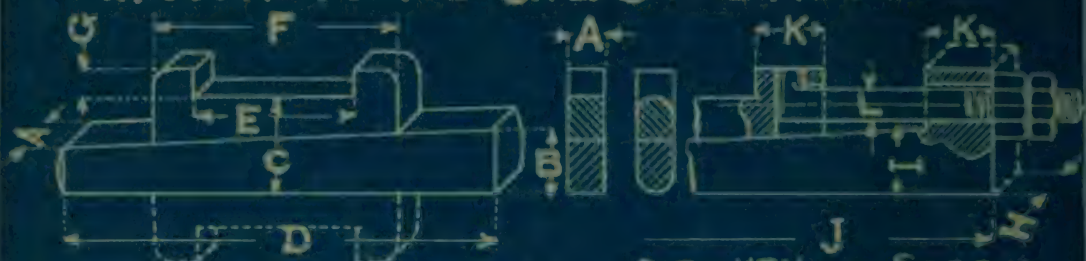








## MANUFACTURED GIBS AND KEYS.

STANDARD TAPER  $\frac{3}{4}$ " IN 12"

GIB &amp; KEY WITH SCREW ADJUSTMENT.

A	B	C	D	E	F	G	NOTE	H	I	J	K	L
1/4"	21/32	1	4	1 1/2	2 1/2	7/32	GIBS ON BOTH SIDE OF KEY AS SHOWN IN FULL AND DOTTED LINES, KEY RECEIVES SCREW ADJUSTMENT AS SHOWN ON PAGE 90.		GIBS WITH SCREW ADJUSTMENT HAVE REGULAR HEAD ON ONE END AND ENLARGED TO (K) ON THE OTHER.			
"	11/16	1	4 1/2	2	2 3/4	"			1 1/32	6 3/8	7/8	3/8
"	23/32	1	5	2 1/4	3	"			1 1/16	6 7/8	"	"
"	3/4	1 1/4	5 1/2	2 1/2	3 1/4	"			1 1/8	7 1/8	1	"
5/16	13/16	"	4 5/8	2 3/8	3 1/8	3/8			1 1/4	7 3/8	"	"
"	27/32	"	5 1/8	2 5/8	3 5/8	"			1 1/2	7 7/8	"	"
"	7/8	"	5 3/8	2 7/8	3 7/8	"			1 3/4	8 1/8	1 1/8	1/2
"	29/32	1 1/2	6 1/8	2 9/8	3 9/8	7/16			"	1 5/8	"	"
3/8	31/32	"	5 5/8	2 11/8	3 11/8	"			"	1 3/4	"	"
"	1	"	6 3/8	2 13/8	4 1/8	"			1 7/8	8 3/8	1 1/4	"
"	1 1/32	"	6 7/8	3 1/16	4 3/16	"			"	1 7/8	"	"
"	1 1/16	1 3/4	6 1/8	3 1/8	4 3/8	1/2			"	1 7/8	"	"
7/16	1 1/8	"	6 5/8	3 1/4	4 1/4	"			"	1 7/8	"	"
"	1 1/4	"	7 1/8	3 3/8	4 1/2	"			"	1 7/8	"	"
"	1 1/2	"	7 3/8	3 5/8	4 3/4	"			"	1 7/8	"	"
"	1 5/8	"	8 1/8	4 1/8	5 1/8	"			"	1 7/8	"	"
"	1 3/4	"	8 3/8	4 1/4	5 3/4	"			"	1 7/8	"	"
"	1 7/8	"	8 5/8	4 1/2	5 5/8	"			"	1 7/8	"	"
1/2	1 31/32	2	8 7/8	4 3/4	5 7/4	9/16			1 1/4	1 7/8	"	"
"	1 15/16	"	9 1/8	4 5/8	5 7/8	"			"	1 7/8	"	"
"	1 11/16	"	9 3/8	4 3/4	5 3/4	"			"	1 7/8	"	"
"	1 5/8	"	9 5/8	4 5/8	5 5/8	"			"	1 7/8	"	"
"	1 3/4	"	9 7/8	4 7/8	5 7/8	"			"	1 7/8	"	"
"	1 15/16	"	10 1/8	4 7/4	6 1/4	"			"	1 7/8	"	"
9/16	1 13/16	2 1/2	10 3/8	4 3/2	6 3/2	5/8			1 3/8	1 7/8	"	5/8
"	1 1/2	"	10 5/8	4 5/8	6 5/8	"			"	1 7/8	"	"
"	1 5/8	"	10 7/8	4 3/4	6 3/4	"			"	1 7/8	"	"
"	1 3/4	"	11 1/8	4 5/4	6 5/4	"			"	1 7/8	"	"
"	1 15/16	"	11 3/8	4 3/2	6 3/2	"			"	1 7/8	"	"
"	1 7/8	"	11 5/8	4 5/8	6 5/8	"			"	1 7/8	"	"
"	1 3/4	"	11 7/8	4 3/2	6 3/2	"			"	1 7/8	"	"
"	1 15/16	"	12 1/8	4 5/4	6 5/4	"			"	1 7/8	"	"
5/8	1 13/16	2 1/2	12 3/8	4 3/2	6 3/2	11/16			1 1/2	1 7/8	"	3/4
"	1 11/16	"	12 5/8	4 5/8	6 5/8	"			"	1 7/8	"	"
"	1 9/16	"	12 7/8	4 3/4	6 3/4	"			"	1 7/8	"	"
"	1 7/8	"	13 1/8	4 5/4	6 5/4	"			"	1 7/8	"	"
"	1 5/8	"	13 3/8	4 3/2	6 3/2	"			"	1 7/8	"	"
"	1 3/4	"	13 5/8	4 5/8	6 5/8	"			"	1 7/8	"	"
"	1 15/16	"	13 7/8	4 3/2	6 3/2	"			"	1 7/8	"	"
3/4	1 13/16	3	14 1/8	4 5/4	6 5/4	3/4			1 3/4	1 7/8	"	"
"	1 11/16	"	14 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	14 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	14 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	15 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	15 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 11/16	"	15 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 9/16	"	15 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 7/8	"	16 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 5/8	"	16 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 3/4	"	16 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 15/16	"	16 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 13/16	"	17 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 11/16	"	17 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	17 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	17 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	18 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	18 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 11/16	"	18 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 9/16	"	18 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 7/8	"	19 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 5/8	"	19 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 3/4	"	19 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 15/16	"	19 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 13/16	"	20 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 11/16	"	20 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	20 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	20 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	21 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	21 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 11/16	"	21 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 9/16	"	21 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 7/8	"	22 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 5/8	"	22 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 3/4	"	22 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 15/16	"	22 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 13/16	"	23 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 11/16	"	23 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	23 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	23 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	24 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	24 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 11/16	"	24 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 9/16	"	24 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 7/8	"	25 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 5/8	"	25 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 3/4	"	25 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 15/16	"	25 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 13/16	"	26 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 11/16	"	26 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	26 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	26 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	27 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	27 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 11/16	"	27 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 9/16	"	27 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 7/8	"	28 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 5/8	"	28 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 3/4	"	28 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 15/16	"	28 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
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"	1 11/16	"	29 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	29 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	29 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	30 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	30 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 11/16	"	30 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 9/16	"	30 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 7/8	"	31 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 5/8	"	31 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 3/4	"	31 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 15/16	"	31 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 13/16	"	32 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 11/16	"	32 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
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"	1 7/8	"	32 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	33 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
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"	1 3/4	"	34 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
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"	1 13/16	"	35 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 11/16	"	35 3/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 9/16	"	35 5/8	4 5/8	6 5/8	"		"	1 7/8	"	"	
"	1 7/8	"	35 7/8	4 3/2	6 3/2	"		"	1 7/8	"	"	
"	1 15/16	"	36 1/8	4 5/4	6 5/4	"		"	1 7/8	"	"	
"	1 13/16	"	36 3/8	4 3/2	6 3/2	"	</					



## WOODRUFF SYSTEM OF KEYING.



K = DIAM. OF KEY &amp; CUTTER

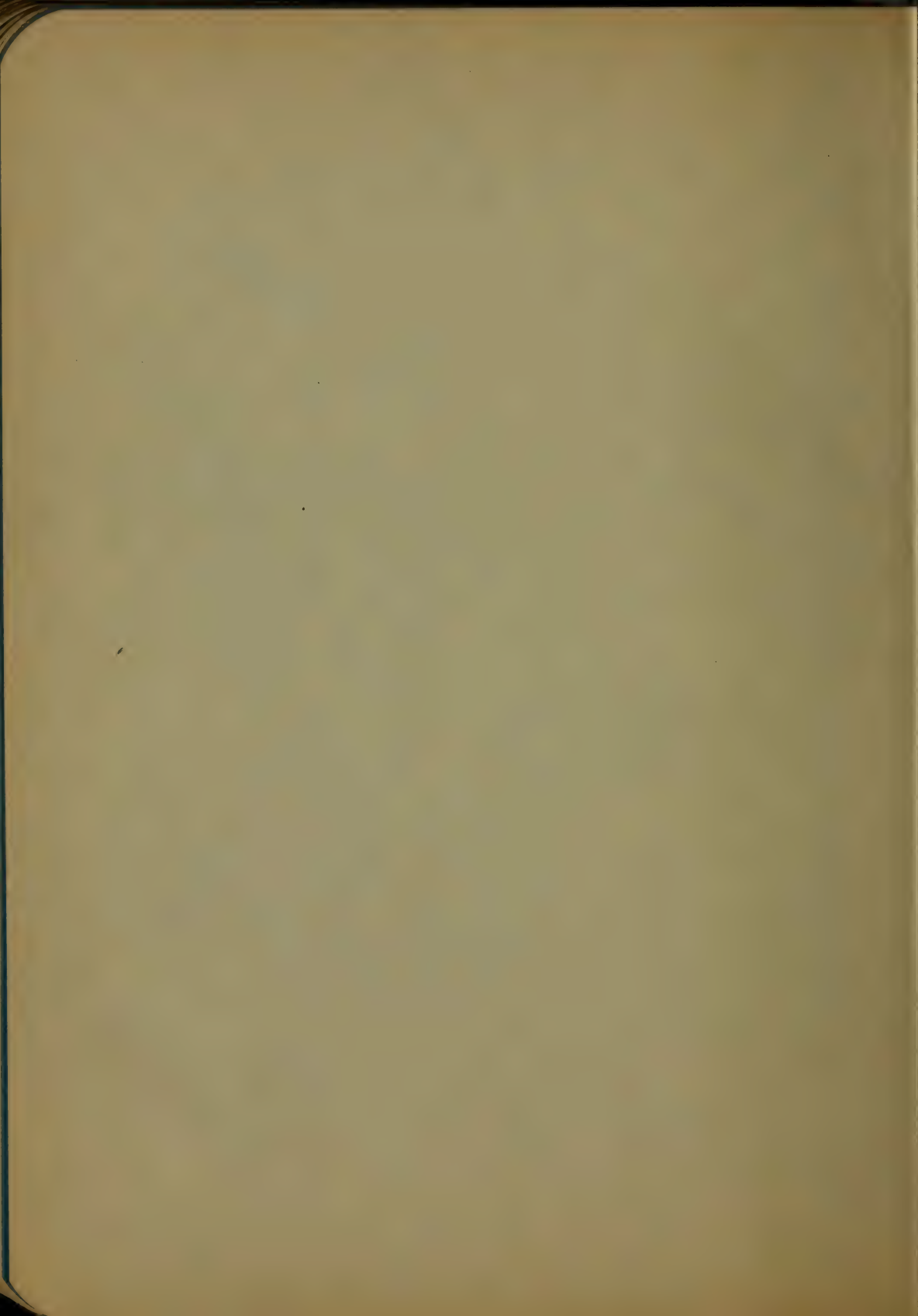
T = THICKNESS " "

N° = COMERCIAL NUMBER  
OF KEYS & CUTTERS.SHEARING  
STRENGTH OF  
KEYS IN LBS.

N°	K	T	A	B	C	D	E	SHEARING STRENGTH OF KEYS IN LBS.
1	1/2	1/16	3/64	1/32	5/64	3/8	.	1566
2	"	3/32	"	3/64	3/32	"	.	2350
3	"	1/8	"	1/16	7/64	1/2	.	3132
4	5/8	3/32	1/16	3/64	7/64	"	.	2937
5	.	1/8	"	1/16	1/8	5/8	.	3915
6	.	5/32	"	5/64	7/64	"	.	4894
7	3/4	1/8	"	1/16	1/8	"	.	4700
8	.	5/32	"	5/64	7/64	"	.	5872
9	.	3/16	"	3/32	7/32	3/4	.	7050
10	7/8	5/32	"	5/64	3/64	"	.	6850
11	.	3/16	"	3/32	7/32	"	.	8280
12	A	7/32	"	7/64	11/64	"	.	9590
13	"	1/4	"	1/8	3/16	7/8	.	10960
14	"	3/16	"	3/32	5/32	"	.	9375
15	"	7/32	"	7/64	13/64	"	.	10987
16	B	1/4	"	1/8	3/16	"	.	12500
17	"	5/16	"	5/32	7/32	"	.	15625
18	1 1/8	3/16	5/64	3/32	11/64	"	.	10545
19	"	7/32	"	7/64	3/16	"	.	12305
20	"	1/4	"	1/8	13/64	"	.	14063
21	C	5/16	"	5/32	15/64	1 1/8	.	17575
22	"	3/16	"	3/32	11/64	"	.	11715
23	"	7/32	"	7/64	3/16	"	.	13671
24	D	1/4	"	1/8	13/64	1 1/8	.	15625
25	"	5/16	"	5/32	15/64	"	.	19530
26	E	3/8	"	3/16	17/64	1 1/4	.	24326
27	"	1/2	3/32	1/8	7/32	"	.	17185
28	F	5/16	"	5/32	1/4	"	.	21485
29	"	3/8	"	3/16	3/32	"	.	25780
30	1 1/2	1/4	7/64	1/8	15/64	"	.	18750
31	"	5/16	"	5/32	17/64	1 3/8	.	23487
32	G	3/8	"	3/16	17/64	"	.	28185
33	"	2 1/8	3/16	17/32	3/32	1	3/32	15910
34	"	1/2	"	1/8	21/32	1 1/8	"	20888
35	"	5/16	"	5/32	11/16	1 1/4	"	25312
36	"	3/8	"	3/16	23/32	1 1/2	"	29700
37	R	2 3/4	1/4	5/8	1/8	3/4	1/8	28125
38	"	"	5/16	"	5/32	25/32	15/8	35156
39	"	"	3/8	"	3/16	13/16	1 3/4	42187
40	"	"	7/16	"	7/32	27/32	"	49218
41	"	"	1/2	"	1/4	7/8	1 7/8	56250
42	"	3 1/2	3/8	13/16	3/16	1	3 1/4	53850
43	"	"	7/16	"	7/32	1 1/32	2	61840
44	"	"	1/2	"	1/4	1 1/16	"	69530
45	"	"	9/16	"	9/32	13/32	2 1/4	76780
46	"	"	5/8	"	5/16	1 1/8	"	83918
47	"	"	11/16	"	11/32	1 5/32	2 1/2	91600
48	"	"	3/4	"	3/8	1 3/16	3	99285

MINIMUM SHAFT  
DIAM.CUTTERS N° 1 TO G  
HAVE UNIFORM  
SHANKS 1/2" IN DIAM.CUTTERS N° 26 TO 29  
HAVE HOLES TO FIT  
3/4" DIAM. ARBORS.N° R TO 36 HAVE  
HOLES FOR 1" DIAM.  
ARBORS.KEYS ARE SELF-  
ADJUSTING TO AN-  
GULAR SPLINES.







## CHAINS.

## DIMENSIONS AND STRENGTH OF WROUGHT IRON CHAINS.

CRANE CHAIN.



CHAIN SHEAVES AND DRUMS.

$E = 12D \text{ to } 25D$   
 $F = D + \frac{1}{16}$ ,  $G = B + \frac{1}{4}$   
 $H = G + \frac{1}{2} \text{ to } G + 1$   
 $L = 5\frac{1}{2}D$ ,  $K = 1\frac{1}{2}S$ ,  $I = D + \frac{1}{8}$ ,  $J = 3D$ ;  
 DISTANCE BETWEEN TWO CHAIN STRANDES ON A  
 DRUM SHOULD BE  $6.5D \text{ to } 7.5D$ ;

D A B C					PITCH	WEIGHT OF LINEAL FOOT. LBS.	B.B.CHAIN.			B.B.B. CRANE CHAIN.		
INCHES.							BREAKING STRAIN. IN LBS.	PROOF IN LBS.	SAFE WORKING LOAD. LBS.	BREAKING STRAIN. IN LBS.	PROOF IN LBS.	SAFE WORKING LOAD LBS.
3/16	3/8	3/16	9/16	1/2	.42	1730	1150	435	.	.	.	
1/4	1/2	7/16	1/2	2 1/2	.91	3070	2045	765	.	.	.	
5/16	13/16	1 1/8	15/16	1 1/16	1.22	4795	3190	1200	.	.	.	
3/8	1 1/4	1 1/2	9/16	1	1.5	6920	4610	1730	8900	5920	2225	
7/16	2	1 5/8	2 1/8	1 1/8	2.0	9400	6260	2350	13400	8925	3350	
1/2	2 1/8	1 3/4	3/4	1 1/4	2.5	12320	8100	3080	15600	10400	4000	
5/16	2 1/8	2	7/8	1 1/2	3.2	15590	10380	3900	22400	14900	5600	
5/8	2 7/8	2 1/4	15/16	1 5/8	4.1	19220	12800	4800	26800	17800	6200	
11/16	3 1/8	2 3/4	1 1/2	1 3/4	5.0	23270	15500	5810	31300	20750	7820	
3/4	3 1/2	2 5/8	1 1/2	1 3/4	5.8	27700	18450	6950	38000	25300	9500	
7/8	3 3/4	2 7/8	1 3/4	2 1/8	6.6	32300	21500	8100	44800	29850	11200	
15/16	4	3 1/8	1 5/8	2 1/4	7.7	37600	25000	9400	51500	34300	12850	
1	4 1/8	3 3/8	1 3/4	2 1/4	8.9	43300	28800	10800	58200	38760	14550	
1 1/16	4 3/8	3 1/2	1 3/4	2 1/4	10.0	49300	32800	12300	62700	41760	15650	
1 1/8	5 1/8	4 1/8	1 3/4	3	11.3	52800	35200	13200	.	.	.	
1 1/4	5 1/4	4 1/4	1 3/4	3	12.6	59200	39200	14800	82800	55150	20700	
1 3/8	5 3/4	4 3/8	1 3/4	3 1/4	14.0	65900	43800	16450	.	.	.	
1 1/2	6 1/8	4 1/2	2 1/4	3 3/4	15.5	73100	48700	18250	100600	67150	25200	
1 5/8	6 3/4	4 3/4	2 1/4	3 3/4	18.5	88300	68800	22100	120900	80500	30220	
1 7/8	7 1/8	5 1/4	2 3/4	4 1/4	22.0	105300	71100	26300	143300	95400	35820	
2	7 1/2	5 1/2	2 3/4	4 1/4	25.5	123500	82250	30850	.	.	.	
2 1/8	8 1/8	6 1/4	2 3/4	4 3/4	29.5	143250	95350	35300	.	.	.	
2 1/4	8 3/4	6 3/4	2 3/4	4 3/4	33.5	164500	109550	41100	.	.	.	
2 3/8	9 1/4	7	3	5 1/4	38.0	187100	124600	46800	.	.	.	
2 1/2	10 1/8	7 3/4	3 1/4	5 1/2	48.5	224400	160550	56100	.	.	.	
2 5/8	11 1/2	8 3/4	3 1/4	6 1/4	60.0	277000	184500	69250	.	.	.	
USE FLANGED PULLEYS FOR TWIST CHAIN.												
MADE IN ALL SIZES.												

USE FLANGED PULLEYS FOR TWIST CHAIN.

MADE IN ALL SIZES

TWIST COIL CHAIN

D = FROM  $\frac{1}{16}$  TO  $\frac{5}{8}$ .

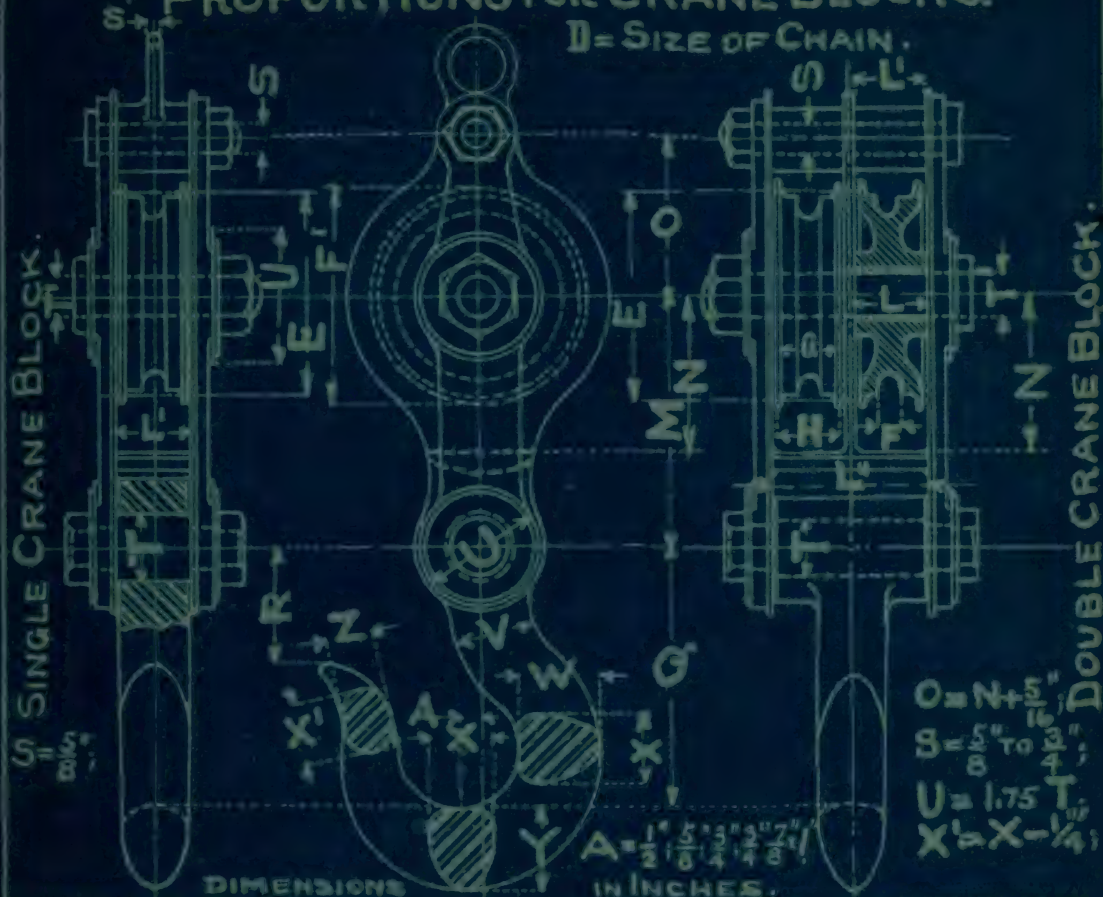


# PROPORTIONS FOR CRANE BLOCKS.

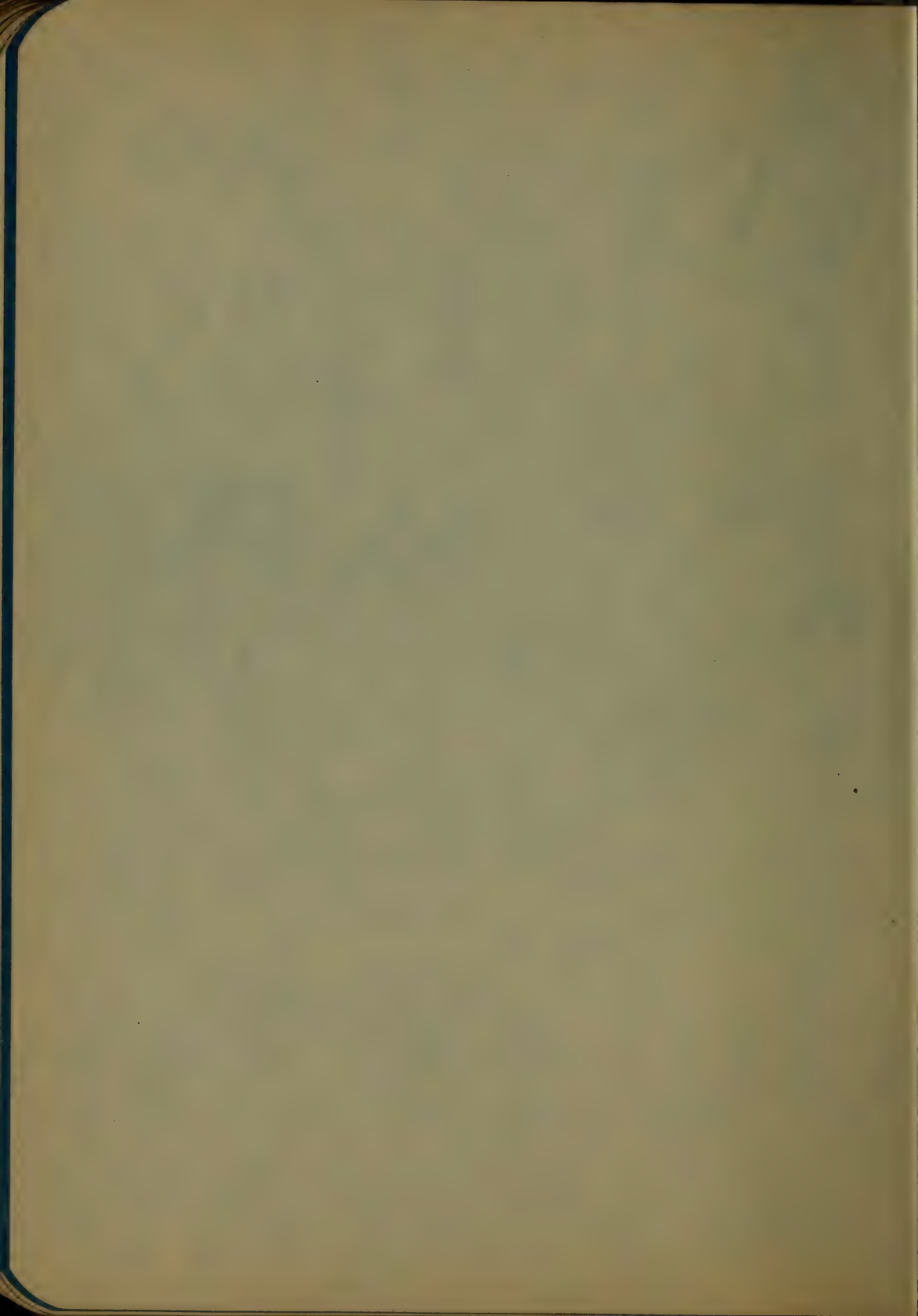
D = SIZE OF CHAIN.

SINGLE CRANE BLOCK.

DOUBLE CRANE BLOCK.



Tons	SINGLE BLOCK						DOUBLE BLOCK					
	2½	5	7½	10	12½	15	5	10	15	20	25	30
1/16	3/16	1/16	13/16	7/8	1	7/16	3/16	9/16	11/16	13/16	7/8	1
5/16	7	8	10	12	14	6	7	8	10	12	14	14 3/4
6 1/2	8	8 3/4	10 3/4	12 3/4	14 3/4	7	8	8 3/4	10 3/4	12 3/4	14 3/4	14 3/4
1 1/2	5/8	3/4	7/8	15/16	1 1/16	2 1/2	5/8	3/4	7/8	15/16	1 1/16	1 1/16
2 1/4	2 1/4	2 3/4	3 3/4	3 5/8	3 3/4	2	2 1/4	2 1/2	3 3/4	3 5/8	3 3/4	3 3/4
2 5/16	3	3 1/8	3 3/8	4 1/8	4 3/8	2 1/2	3	3 1/8	3 3/8	4 1/8	4 3/8	4 5/8
2 3/8	3 1/8	3 1/2	4 1/8	4 3/8	4 7/8	2 5/8	3 1/8	3 1/2	4 1/8	4 3/8	4 5/8	4 5/8
7	8	8 1/2	10	10 1/2	12	7	8	8 1/2	10	10 1/2	12	12 1/2
4 1/4	5	5 3/8	6 1/8	7 1/8	8 1/8	4 1/2	5	5 3/8	6 1/8	7 1/8	8 1/8	8 1/8
4 3/8	5 3/4	6 5/8	7 1/2	8 1/2	9 1/2	5 3/4	7 1/2	8 1/2	9 1/2	10 1/2	11 1/2	11 1/2
2 1/8	2 3/4	2 5/8	3 1/4	3 3/4	4 1/4	2 3/8	3 1/4	3 3/8	4 1/4	4 3/4	5 1/4	5 1/4
1 1/8	1 1/16	1 3/16	1 3/8	1 3/4	1 7/8	1 1/2	1 1/2	1 3/8	1 3/4	1 7/8	1 7/8	1 7/8
1 1/16	1 1/8	1 1/4	1 3/8	1 3/4	1 7/8	1 1/2	1 1/2	1 3/8	1 3/4	1 7/8	1 7/8	1 7/8
1 3/8	1 5/8	1 7/8	2 1/8	2 1/4	2 3/4	1 3/8	1 3/8	1 5/8	2 1/8	2 1/4	2 3/4	2 3/4
1 3/4	1 7/8	2 1/4	2 3/8	2 3/4	3	1 7/8	2	2 1/8	2 3/4	2 3/8	2 3/4	2 3/4
1 5/16	1 11/16	2 1/2	2 3/8	2 3/4	3 1/4	1 5/8	2 1/8	2 3/8	2 3/4	2 3/8	2 3/4	2 3/4
7/8	1	2 1/4	2 3/8	2 3/4	3 1/4	1 1/2	2 1/8	2 3/8	2 3/4	2 3/8	2 3/4	2 3/4







# DETACHABLE CHAIN BELTING. DROP FORGED MALLEABLE IRON

NUMBER OF  
SINGLE  
INCHES  
EQUIVALENT  
IN LEATHER  
BELTING



MADE WITH ROUND SIDE BARS  
FOR AND RIBBED SIDE BARS.  
HUBS, BORE, ARMS ETC. SEE PAGE 130  
TOOTH SECTION AT PITCH CIRCLE. AND 140.



NUMBER OF SINGLE DOUB.	LINKS PER FOOT	WIDTH PITCH	APPROXIMATE HORSE POWER										SPROCKET WHEELS				
			SPEED IN FEET PER MINUTE										T	PITCH DIAM.	NUMBER OF TEETH.		
75	13.3	3 3/4	.902"	.2	.4	.6	.8	1.0	1.2	1.35	1.5	1.65	1.75	1000	3/8	1 1/2 TO 2 1/4	5 TO 84
150	10.4	3 1/2	1.142	.35	.7	1.0	1.3	1.6	1.9	2.2	2.5	2.75	3.1	900	1/2	2 " 16 1/2	5 " 45
225	8.6	3 1/4	1.395	.4	.8	1.2	1.6	2.0	2.3	2.6	2.9	3.2	3.5	800	5/8	3 " 24	7 " 54
300	7.4	3 3/8	1.621	.45	.9	1.35	1.8	2.2	2.6	3.0	3.4	3.7	4.0	700	7/8	2 1/2 " 42	5 " 82
350	8.8	3 1/2	1.363	.5	1.0	1.5	2.0	2.5	2.9	3.3	3.7	4.0	4.3	600	1 1/8	3 " 24	5 " 55
400	7.4	3 1/4	1.621	.55	1.1	1.65	2.2	2.7	3.2	3.6	4.0	4.3	4.6	500	1 1/4	2 1/2 " 42	5 " 50
450	5.2	3 3/8	1.863	.6	1.2	1.8	2.4	3.0	3.5	4.0	4.5	5.0	5.5	400	1 3/8	3 1/4 " 30 1/2	6 " 64
500	7.3	3 1/2	1.643	.75	1.5	2.2	3.0	3.7	4.3	5.0	5.7	6.4	7.1	300	1 1/2	4 1/2 " 42	5 " 62
550	6.2	3 3/8	2.307	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	200	1 3/4	5 " 30 1/2	6 " 58
600	5.2	3 1/4	2.609	1.1	2.2	3.3	4.4	5.5	6.7	7.8	8.9	10.0	11.1	150	1 5/8	6 " 47 1/2	6 " 55
650	4.6	3 3/8	2.307	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	100	1 3/4	7 " 47 1/2	5 " 64
700	4.6	3 1/2	2.609	1.3	2.6	3.9	5.1	6.3	7.5	8.7	9.9	11.1	12.3	75	1 1/2	8 " 47 1/2	5 " 64
750	5.2	3 3/8	2.609	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.6	14.0	50	1 1/4	9 " 47 1/2	5 " 64
800	4.6	3 1/4	2.609	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	25	1 1/8	10 " 47 1/2	5 " 64
1000	3.3	3 3/8	2.609	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	10	1 1/4	12 " 47 1/2	6 " 64
1200	3.3	3 1/2	2.609	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	8	1 1/2	14 " 47 1/2	6 " 64
1300	4.6	3 3/8	2.609	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	6	1 1/4	16 " 47 1/2	6 " 64
1600	3.3	3 1/4	2.609	3.5	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0	4	1 1/2	18 " 47 1/2	6 " 64
1800	3.3	3 3/8	2.609	3.5	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0	3	1 1/4	20 " 47 1/2	6 " 64
2000	2.55	3 1/2	2.609	4.1	8.2	12.3	16.4	20.5	24.6	28.7	32.8	36.9	41.0	2	1 1/2	22 " 47 1/2	6 " 64
2500	2.55	3 3/8	2.609	4.1	8.2	12.3	16.4	20.5	24.6	28.7	32.8	36.9	41.0	1	1 1/2	24 " 47 1/2	6 " 64
2800	3.7	3 1/4	2.609	4.1	8.2	12.3	16.4	20.5	24.6	28.7	32.8	36.9	41.0	1	1 1/2	26 " 47 1/2	6 " 64
4000	1.2	3 3/8	2.609	6.3	12.4	18.6	24.8	31.0	37.2	43.4	49.6	55.8	62.0	1	1 1/2	28 " 47 1/2	6 " 64

SPROCKET WHEELS ARE CAST SPLIT OR ABOVE 60" PITCH DIAM. IN 6, 7, 8, 9 OR 10 SEGMENTS.





## BOLTS AND NUTS.

## DIMENSIONS OF BOLTS AND NUTS.



BOLTS AND THREADS.							ROUGH & FINISHED NUTS AND HEADS.							100000 LB SAFE TENSILE STRAIN
D	N	A	D'	A'	H	F	B	C	E	G	K	P	R	
1/4	20	.049	.185	.027	.0325	.0062	1/2	3/4	4 3/4		1/4	1/4	7/32	276
5/16	18	.077	.240	.045	.036	.007	19/32	11/16	5 1/4		5/16	13/16	9/32	480
3/8	16	.110	.294	.068	.0405	.0078	11/16	5 1/4	6 1/4		3/8	1 1/2	11/32	756
7/16	14	.150	.344	.093	.0465	.0089	5/8	2 3/4	1 7/8		7/16	2 1/4	13/32	930
1/2	13	.196	.400	.123	.05	.0096	3/8	1	1 5/8		1/2	2 3/4	7/16	1256
9/16	12	.249	.454	.162	.054	.0104	4/8	1 1/8	1 3/4		9/16	3 1/4	1/2	1618
5/8	11	.307	.507	.202	.059	.0113	1 1/8	1 3/8	1 1/2	3/8	5/8	3 3/4	9/16	2012
3/4	10	.442	.620	.302	.065	.0125	1 1/4	1 3/4	1 3/4	1	3/4	4 1/4	1 1/2	3020
7/8	9	.601	.731	.420	.072	.014	1 3/8	1 7/8	2 1/2	1 1/8	7/8	5 1/4	1 3/4	4200
1 1/8	8	.785	.857	.550	.081	.0156	1 5/8	1 7/8	2 3/4	1 1/4	1	6 1/4	2 1/2	5500
1 1/4	7	.994	.940	.694	.093	.018	1 7/8	2 3/8	3 1/2	1 1/2	1 1/8	7 1/4	3 1/4	6940
1 1/2	6	1.227	1.065	.893	.093	.018	2	2 5/8	3 3/4	1 3/4	1 1/4	8 1/4	4 1/4	8910
1 3/8	5	1.485	1.160	1.057	.1075	.021	2 1/8	2 3/4	3 3/4	1 3/4	1 3/8	9 1/4	4 3/4	10570
1 1/2	6	1.767	1.284	1.295	.108	.021	2 3/8	2 3/4	3 3/4	1 3/4	1 1/2	1 1/4	5 1/4	12900
1 5/8	5 1/2	2.074	1.389	1.515	.118	.0227	2 3/4	2 3/4	3 3/4	2	1 1/2	1 1/2	5 1/4	15100
1 3/4	5	2.405	1.490	1.744	.130	.025	2 3/4	3 3/4	4 1/2	2 1/2	1 3/8	1 1/2	5 1/4	17400
1 7/8	5	2.761	1.615	2.048	.130	.025	2 3/4	3 3/4	4 1/2	2 1/2	1 3/8	1 1/2	5 1/4	20500
2	4 1/2	3.142	1.772	2.302	.1445	.028	3 3/8	3 3/4	4 1/2	2 3/4	2	1 3/8	1 1/2	23000
2 1/8	4 1/2	3.976	1.962	3.025	.162	.028	3 1/2	4 1/4	4 1/4	2 3/4	2 1/4	1 3/4	2	30800
2 1/4	4	4.909	2.175	3.715	.163	.031	3 3/8	4 1/4	5 1/4	3	2 1/2	1 3/4	2 1/4	37100
2 3/8	4	5.940	2.425	4.619	.185	.031	4 1/4	4 1/4	6	3 1/4	2 3/4	2 3/4	2 3/4	46200
3	3 3/8	7.069	2.629	5.428	.186	.0357	4 3/8	5 3/8	6 3/8	3 3/4	3	2 3/4	2 3/4	54200
3 1/4	3 3/8	8.296	2.879	6.510	.20	.0384	5	5 3/8	7 1/4	3 3/4	3 1/4	2 3/4	2 3/4	65100
3 1/2	3 3/4	9.621	3.100	7.648	.216	.041	5 1/2	6 3/8	7 1/4	4	3 1/2	2 3/4	3 1/4	75500
3 3/4	3	11.045	3.317	8.641	.217	.041	5 3/4	6 3/8	8 1/4	4 1/4	3 3/4	2 3/4	3 1/4	86400
4	3	12.566	3.567	9.990	.226	.0435	6 3/8	7 3/8	8 1/4	4 1/4	4	3 3/4	3 1/4	100000
4 1/8	2 3/4	14.186	3.798	11.329	.236	.046	6 1/2	7 3/8	9 1/4	4 3/4	4 1/4	3 3/4	3 1/4	113400
4 1/4	2 3/4	15.904	4.028	12.743	.247	.048	6 3/4	7 3/8	9 1/4	5 3/8	4 1/2	3 3/4	4 1/4	127900
4 1/2	2 3/4	17.721	4.255	14.200	.260	.050	7 3/8	8 3/8	10 1/4	5 3/8	4 3/4	3 3/4	4 1/4	142200
5	2 1/2	19.635	4.480	15.763	.260	.050	7 3/4	8 3/8	10 1/4	5 3/4	5	3 3/4	4 1/4	157600
5 1/8	2 1/2	21.648	4.730	17.572	.273	.052	8	9 3/8	11 1/4	6	5 1/4	4	4 1/4	175700
5 1/4	2 1/2	23.758	4.953	19.267	.274	.052	8 1/4	9 3/8	11 1/4	6 1/4	5 1/4	4 1/4	4 1/4	192700
5 1/2	2 1/2	25.967	5.103	21.262	.284	.052	8 3/4	10 3/8	12 1/4	6 1/2	5 1/4	4 1/4	5 1/4	212500
6	2 1/4	28.274	5.423	23.078	.294	.055	9 1/4	10 3/8	12 1/4	6 3/4	6	4 1/4	5 1/4	230900



## MANUFACTURERS' STANDARD.

ADOPTED SEP. 20. 1899. TO TAKE  
EFFECT OCT. 1. 1899.

## MACHINE &amp; COUPLING BOLTS

DIAM. OF BOLTS.		STANDARD U.S. THREADS PER INCH		STANDARD V. THREADS PER INCH		DRILL OR ROUGH HOLE FOR V. THREADS.		SQUARE HEAD & NUT		HEXAGON HEAD		BUTTON HEAD		COUNTERSUNK HEAD		COUPLING BOLT.	
D	N	N'	R	J	M	L	I	X	S	P	T	V	O	B	C	K	
1/4	20	20	3/16	7/16	5/16	3/16	7/16	33/64	3/16	11/16	5/32	1/2	3/16	1/2	27/64	1/4	
5/16	18	18	1/4	1/2	23/32	1/4	1/2	37/64	1/4	13/16	3/16	5/8	1/4	13/32	4/16	5/16	
3/8	16	16	19/64	13/32	27/32	9/32	5/8	23/32	3/8	7/8	1/4	11/16	1/4	11/16	51/64	3/8	
7/16	14	14	11/32	11/16	31/32	3/8	11/16	51/64	13/32	1	5/16	3/4	1/4	25/32	23/32	7/8	
1/2	13	12	13/16	3/4	1 1/16	7/16	1 1/2	15/16	7/16	1 1/8	3/8	7/8	1/4	7/8	1	1/2	
9/16	12	12	29/64	23/32	1 1/4	1/2	7/8	1	1/2	1 1/4	7/16	15/16	5/16	2 1/32	1 1/8	9/16	
5/8	11	11	33/64	15/16	1 1/2	5/8	1 1/16	1 1/8	9/16	1 1/2	7/16	1 1/8	5/16	1 1/16	1 3/8	5/8	
3/4	10	10	5/8	1 1/8	1 3/4	5/8	1 1/16	1 5/8	1 1/16	1 3/4	1/2	1 3/8	3/8	1 1/4	1 3/8	3/4	
7/8	9	9	47/64	1 1/16	1 5/4	3/4	1 1/8	1 3/4	13/16	1 7/8	5/8	1 1/2	3/8	1 1/2	1 5/8	7/8	
1	8	8	27/32	1 1/2	2 1/8	7/8	1 1/16	1 5/4	15/16	2 1/8	3/4			1 5/8	1 3/4	1	
1 1/8	7	7	15/16	1 5/8	2 9/16	1	1 1/16	1 5/2	1 1/16					1 11/16	2 3/8	1 1/8	
1 1/4	7	7	1 1/16	1 3/4	2 3/4	1 1/8	1 1/16	2 5/32	1 3/16					2 1/16	2 5/8	1 1/2	
1 3/8	6	6	1 1/8	2 1/8	3	1 1/4	2 1/16	2 3/8	1 3/16					2 3/16	2 3/4	1 3/8	
1 1/2	6	6	1 3/16	2 5/8	3 1/4	1 1/2	2 1/4	2 17/32	1 1/2					2 3/8	2 3/2	1 1/2	
1 5/8	5 1/2	5 1/2	1 1/2	2 1/2	3 7/16	1 5/8	2 1/2	2 11/16	1 5/8					2 3/4	2 3/2	1 5/8	
1 3/4	5	5	1 1/2	2 1/2	3 3/4	1 3/4	2 5/8	3 1/2	1 1/2					2 3/2	3 1/8	1 3/4	
1 7/8	5	5	1 5/8	3	4 1/4	1 3/4	2 7/8	3 1/2	1 1/2					2 15/16	3 1/2	1 7/8	
2	4 1/2	4 1/2	1 5/8	3 1/8	4 3/4	1 7/8	3	3 5/8	1 1/2					3 1/8	3 3/8	2	

U.S. THREAD V.

PITCH PITCH

H = 3/8 H' OR  
H = 1.333 H;

PITCH = NUMBER PER INCH.

MANUFACTURED LENGTH OF BOLTS L INCHES.	1 1/2" TO 30" ADVANCING 1" UP TO 8" AND 1" TO 30"	1 1/2" TO 20" ADVANCING 1" UP TO 8"	1" TO 8" ADVANCING 1/4"	2" TO 6" ADVANCING 1/8"
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U.S. THREAD V.



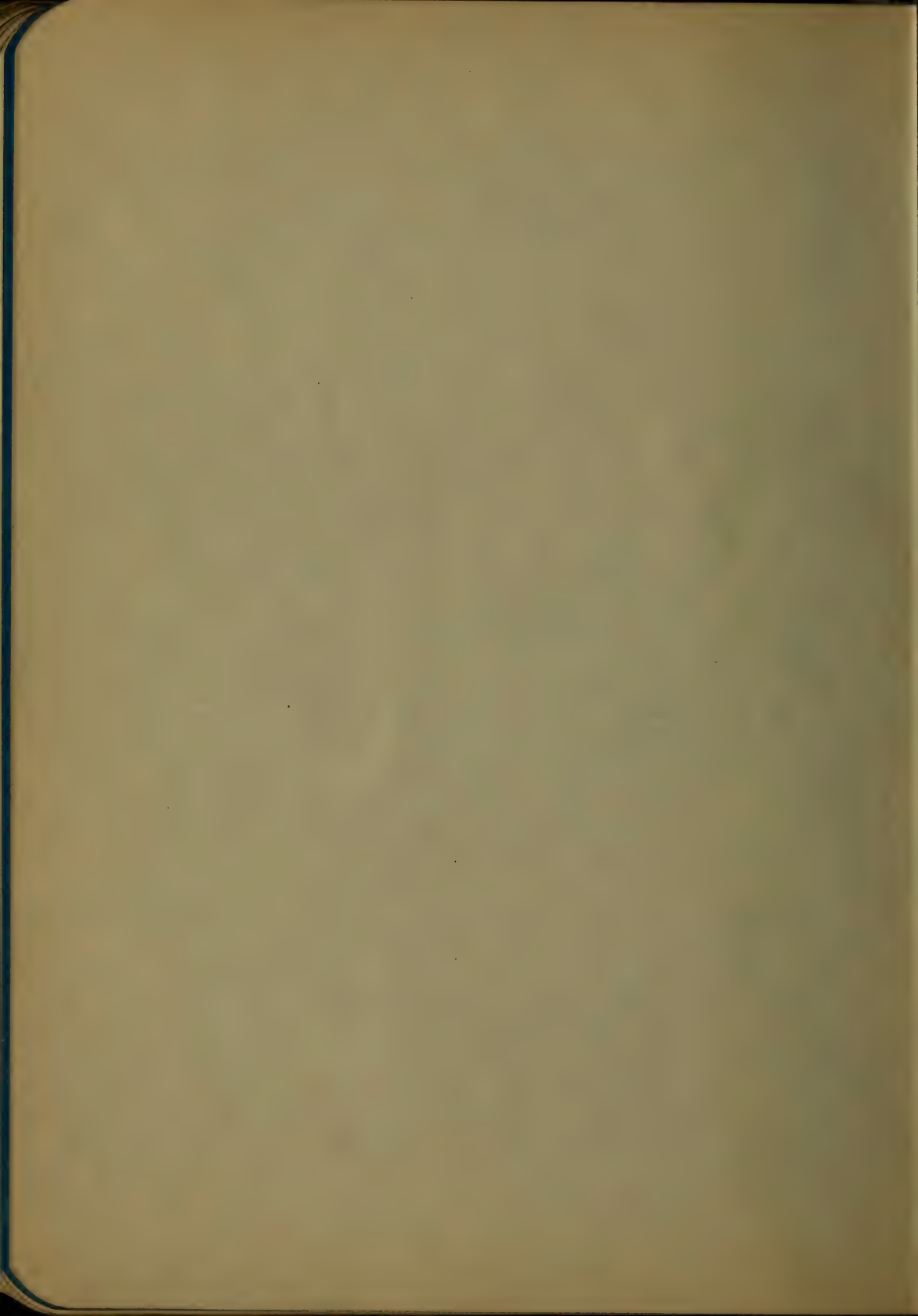
$$H = \frac{3}{8} H' \text{ OR}$$

$$H = 1.333 H'$$

PITCH = NUMBER PER  
INCH.MANUFACTURED  
LENGTH OF  
BOLTS  
L INCHES.1 1/2" TO 30"  
ADVANCING  
1/2" UP TO 8" AND 1" TO 30"1 1/2" TO 20"  
ADVANCING  
1/2" UP TO 8"1" TO 8"  
ADVANCING  
1/4"2" TO 6"  
ADVANCING  
1/8"

## WEIGHTS OF 100 MACHINE BOLTS WITH HEADS AND NUTS. IN LBS.







DIA. OF BOLTS	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	2
HEXAGON NUT	1.3	4.3	7.5	16	22.3	37.7	57.5	100	138	185	244	333	448	490	490
" " HEAD	.9	2.4	5.9	11.2	19	33	48	64	83	102	124	145	180	210	270
SQUARE NUT	1.5	2.5	4.1	16	25	42	64	94	124	163	215	280	360	400	500
" " HEAD	1	2.8	6.8	13	22	34.8	54.7	73.3	95.7	121.3	151.3	186	240	241	300







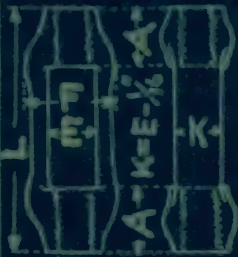


# CAP SCREWS.

B = DIAM. OF HEAD.

DIAMETER OF SCREW INCHES	NUMBER OF THREADS PER INCH. N	HEXAGON HEAD	SQUARE HEAD	FLAT HEAD	ROUND HEAD	BUTTON HEAD	FLAT HEAD	COLLAR HEAD		SIZE OF SLOT		SIZE OF TAP DRILL.	DEPTH OF COUNTER BORE.
								B	D	WIDTH.	DEPTH		
1/8	40	•	•	3/16	3/16	7/32	1/4	1/4	9/32	.025	1/8	3/32	3/32
3/16	28, 24	•	•	1/4	1/4	5/16	3/8	5/16	3/8	.042	3/16	5/32	1/8
1/4	22, 20	7/16	3/8	3/8	3/8	7/16	1/2	7/16	1/2	.058	1/2	3/16	5/32
5/16	20, 18	1/2	7/16	7/16	7/16	9/16	5/8	9/16	5/8	.072	5/16	1/4	3/16
3/8	16	9/16	1/2	9/16	9/16	5/8	3/4	5/8	3/4	.083	3/4	1/2	1/4
7/16	14	5/8	5/8	5/8	5/8	3/4	13/16	7/8	1	.095	7/8	5/8	5/8
1/2	13, 12	3/4	11/16	3/4	13/16	15/16	1	1	1	.109	1	1	1
9/16	12	13/16	1	1	1	1	1	1	1	.134	1	1	1
5/8	11	7/8	3/4	7/8	7/8	1	1	1	1	.148	1	1	1
3/4	10	1	1	1	1	1	1	1	1	.165	1	1	1
7/8	9	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	.185	1 1/8	1 1/8	1 1/8
1	8	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	.2	1 1/4	1 1/4	1 1/4
1 1/8	7	1 3/8	1 3/8	•	•	•	•	•	•	•	•	•	•
1 1/4	7	1 1/2	1 1/2	•	•	•	•	•	•	•	•	•	•
1 3/8	6	1 5/8	1 5/8	•	•	•	•	•	•	•	•	•	•
H		3/4 L	3/4 L	2/3 L	2/3 L	3/4 L to L	3/4 L	3/4 L	3/4 L	C = B + 1/32"			
L		LENGTH UNDER HEAD 3/4" TO 5" LONG			3/4" TO 3" LONG			3/4" TO 5"					

## TURNBUCKLES, AND RIGHT AND LEFT NUTS.

DIAMETER OF SCREW INCHES	PLANKER HEAD BOLTS	BOILER PATCH BOLTS	HEAD & HEADLESS SET SCREWS		TURNBUCKLES, AND RIGHT AND LEFT NUTS.						
											
	B	T	B	N	D	D	A	E	F	G	B
5/16	•	•	•	•	1/4	3/8	3/16	3/8	1/2	5/8	11/16
3/8	•	•	•	•	5/16	7/16	2/32	5/8	13/16	1 1/16	3 1/4
7/16	•	•	•	•	3/8	1/2	3/4	3/8	1 1/8	1 3/8	3 3/4
1/2	7/8	5/16	7/8	14	1/2	9/16	2 3/32	13/16	1 1/2	1 1/2	1
9/16	1	5/16	•	•	5/8	1 1/8	1 1/8	1 1/2	1 3/4	2	1 1/4
5/8	1 1/8	3/8	1 1/8	12	3/4	1 1/4	1 1/4	1 3/4	2 1/4	2 1/4	1 1/2
3/4	1 1/4	7/16	1 1/2	12	1	1 1/2	1 1/2	1 3/4	2 1/2	2 1/2	1 5/8
7/8	•	•	1 5/8	12	1 1/8	1 3/4	1 3/4	2	2 3/4	2 3/4	2
1	N = 12 FOR ALL.	•	1 3/4	12	1 1/4	1 3/4	1 3/4	2 1/4	2 3/4	2 3/4	2 1/4
1 1/8	•	•	1 7/8	12	1 1/2	1 3/4	1 3/4	2 1/4	2 3/4	2 3/4	2 1/4
H	3/4 L to 3 L	3/4 L	•	•	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8
L	1" TO 2"	3/4 TO 1 1/4	3/4 TO 1 1/4	3/4 TO 1 1/4	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8

STAND. LENGTH. L = 6", 9", 12", 18" ACCORDING SIZES.







## CARRYING CAPACITY AND DEFLECTION



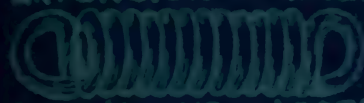
# ROUND & SQUARE STEEL SPIRAL SPRINGS.

**S** = DEFLECTION PER COIL FOR EACH 100 LBS. OF SAFE LOAD IN INCHES.

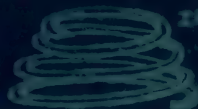
**N** = NUMBER OF COILS = THE REQUIRED DEFLECTION OF A SPIRAL

SPRING DIVIDED BY THE PRODUCT OF NUMBER OF 100 LBS. OF THE  
LOAD AND THE DEFLECTION GIVEN IN THE TABLE.

EXTENSION SPRINGS. VALVE SPRINGS. (TEMP. STEEL, BRASS, BRONZE)



WITH HOOKS OR LOOPS.



ENDS ARE PLAIN, SQUARED  
AND GROUND.

OR SQUARE OF WIRE IN INCHES.

3/16	1/2	5/16	5/8	1 1/16	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6	6 1/4	6 1/2	6 3/4	7	7 1/4	7 1/2	7 3/4	8	8 1/4	8 1/2	8 3/4	9	9 1/4	9 1/2	9 3/4	10	10 1/4	10 1/2	10 3/4	11	11 1/4	11 1/2	11 3/4	12	12 1/4	12 1/2	12 3/4	13	13 1/4	13 1/2	13 3/4	14	14 1/4	14 1/2	14 3/4	15	15 1/4	15 1/2	15 3/4	16	16 1/4	16 1/2	16 3/4	17	17 1/4	17 1/2	17 3/4	18	18 1/4	18 1/2	18 3/4	19	19 1/4	19 1/2	19 3/4	20	20 1/4	20 1/2	20 3/4	21	21 1/4	21 1/2	21 3/4	22	22 1/4	22 1/2	22 3/4	23	23 1/4	23 1/2	23 3/4	24	24 1/4	24 1/2	24 3/4	25	25 1/4	25 1/2	25 3/4	26	26 1/4	26 1/2	26 3/4	27	27 1/4	27 1/2	27 3/4	28	28 1/4	28 1/2	28 3/4	29	29 1/4	29 1/2	29 3/4	30	30 1/4	30 1/2	30 3/4	31	31 1/4	31 1/2	31 3/4	32	32 1/4	32 1/2	32 3/4	33	33 1/4	33 1/2	33 3/4	34	34 1/4	34 1/2	34 3/4	35	35 1/4	35 1/2	35 3/4	36	36 1/4	36 1/2	36 3/4	37	37 1/4	37 1/2	37 3/4	38	38 1/4	38 1/2	38 3/4	39	39 1/4	39 1/2	39 3/4	40	40 1/4	40 1/2	40 3/4	41	41 1/4	41 1/2	41 3/4	42	42 1/4	42 1/2	42 3/4	43	43 1/4	43 1/2	43 3/4	44	44 1/4	44 1/2	44 3/4	45	45 1/4	45 1/2	45 3/4	46	46 1/4	46 1/2	46 3/4	47	47 1/4	47 1/2	47 3/4	48	48 1/4	48 1/2	48 3/4	49	49 1/4	49 1/2	49 3/4	50	50 1/4	50 1/2	50 3/4	51	51 1/4	51 1/2	51 3/4	52	52 1/4	52 1/2	52 3/4	53	53 1/4	53 1/2	53 3/4	54	54 1/4	54 1/2	54 3/4	55	55 1/4	55 1/2	55 3/4	56	56 1/4	56 1/2	56 3/4	57	57 1/4	57 1/2	57 3/4	58	58 1/4	58 1/2	58 3/4	59	59 1/4	59 1/2	59 3/4	60	60 1/4	60 1/2	60 3/4	61	61 1/4	61 1/2	61 3/4	62	62 1/4	62 1/2	62 3/4	63	63 1/4	63 1/2	63 3/4	64	64 1/4	64 1/2	64 3/4	65	65 1/4	65 1/2	65 3/4	66	66 1/4	66 1/2	66 3/4	67	67 1/4	67 1/2	67 3/4	68	68 1/4	68 1/2	68 3/4	69	69 1/4	69 1/2	69 3/4	70	70 1/4	70 1/2	70 3/4	71	71 1/4	71 1/2	71 3/4	72	72 1/4	72 1/2	72 3/4	73	73 1/4	73 1/2	73 3/4	74	74 1/4	74 1/2	74 3/4	75	75 1/4	75 1/2	75 3/4	76	76 1/4	76 1/2	76 3/4	77	77 1/4	77 1/2	77 3/4	78	78 1/4	78 1/2	78 3/4	79	79 1/4	79 1/2	79 3/4	80	80 1/4	80 1/2	80 3/4	81	81 1/4	81 1/2	81 3/4	82	82 1/4	82 1/2	82 3/4	83	83 1/4	83 1/2	83 3/4	84	84 1/4	84 1/2	84 3/4	85	85 1/4	85 1/2	85 3/4	86	86 1/4	86 1/2	86 3/4	87	87 1/4	87 1/2	87 3/4	88	88 1/4	88 1/2	88 3/4	89	89 1/4	89 1/2	89 3/4	90	90 1/4	90 1/2	90 3/4	91	91 1/4	91 1/2	91 3/4	92	92 1/4	92 1/2	92 3/4	93	93 1/4	93 1/2	93 3/4	94	94 1/4	94 1/2	94 3/4	95	95 1/4	95 1/2	95 3/4	96	96 1/4	96 1/2	96 3/4	97	97 1/4	97 1/2	97 3/4	98	98 1/4	98 1/2	98 3/4	99	99 1/4	99 1/2	99 3/4	100	100 1/4	100 1/2	100 3/4	101	101 1/4	101 1/2	101 3/4	102	102 1/4	102 1/2	102 3/4	103	103 1/4	103 1/2	103 3/4	104	104 1/4	104 1/2	104 3/4	105	105 1/4	105 1/2	105 3/4	106	106 1/4	106 1/2	106 3/4	107	107 1/4	107 1/2	107 3/4	108	108 1/4	108 1/2	108 3/4	109	109 1/4	109 1/2	109 3/4	110	110 1/4	110 1/2	110 3/4	111	111 1/4	111 1/2	111 3/4	112	112 1/4	112 1/2	112 3/4	113	113 1/4	113 1/2	113 3/4	114	114 1/4	114 1/2	114 3/4	115	115 1/4	115 1/2	115 3/4	116	116 1/4	116 1/2	116 3/4	117	117 1/4	117 1/2	117 3/4	118	118 1/4	118 1/2	118 3/4	119	119 1/4	119 1/2	119 3/4	120	120 1/4	120 1/2	120 3/4	121	121 1/4	121 1/2	121 3/4	122	122 1/4	122 1/2	122 3/4	123	123 1/4	123 1/2	123 3/4	124	124 1/4	124 1/2	124 3/4	125	125 1/4	125 1/2	125 3/4	126	126 1/4	126 1/2	126 3/4	127	127 1/4	127 1/2	127 3/4	128	128 1/4	128 1/2	128 3/4	129	129 1/4	129 1/2	129 3/4	130	130 1/4	130 1/2	130 3/4	131	131 1/4	131 1/2	131 3/4	132	132 1/4	132 1/2	132 3/4	133	133 1/4	133 1/2	133 3/4	134	134 1/4	134 1/2	134 3/4	135	135 1/4	135 1/2	135 3/4	136	136 1/4	136 1/2	136 3/4	137	137 1/4	137 1/2	137 3/4	138	138 1/4	138 1/2	138 3/4	139	139 1/4	139 1/2	139 3/4	140	140 1/4	140 1/2	140 3/4	141	141 1/4	141 1/2	141 3/4	142	142 1/4	142 1/2	142 3/4	143	143 1/4	143 1/2	143 3/4	144	144 1/4	144 1/2	144 3/4	145	145 1/4	145 1/2	145 3/4	146	146 1/4	146 1/2	146 3/4	147	147 1/4	147 1/2	147 3/4	148	148 1/4	148 1/2	148 3/4	149	149 1/4	149 1/2	149 3/4	150	150 1/4	150 1/2	150 3/4	151	151 1/4	151 1/2	151 3/4	152	152 1/4	152 1/2	152 3/4	153	153 1/4	153 1/2	153 3/4	154	154 1/4	154 1/2	154 3/4	155	155 1/4	155 1/2	155 3/4	156	156 1/4	156 1/2	156 3/4	157	157 1/4	157 1/2	157 3/4	158	158 1/4	158 1/2	158 3/4	159	159 1/4	159 1/2	159 3/4	160	160 1/4	160 1/2	160 3/4	161	161 1/4	161 1/2	161 3/4	162	162 1/4	162 1/2	162 3/4	163	163 1/4	163 1/2	163 3/4	164	164 1/4	164 1/2	164 3/4	165	165 1/4	165 1/2	165 3/4	166	166 1/4	166 1/2	166 3/4	167	167 1/4	167 1/2	167 3/4	168	168 1/4	168 1/2	168 3/4	169	169 1/4	169 1/2	169 3/4	170	170 1/4	170 1/2	170 3/4	171	171 1/4	171 1/2	171 3/4	172	172 1/4	172 1/2	172 3/4	173	173 1/4	173 1/2	173 3/4	174	174 1/4	174 1/2	174 3/4	175	175 1/4	175 1/2	175 3/4	176	176 1/4	176 1/2	176 3/4	177	177 1/4	177 1/2	177 3/4	178	178 1/4	178 1/2	178 3/4	179	179 1/4	179 1/2	179 3/4	180	180 1/4	180 1/2	180 3/4	181	181 1/4	181 1/2	181 3/4	182	182 1/4	182 1/2	182 3/4	183	183 1/4	183 1/2	183 3/4	184	184 1/4	184 1/2	184 3/4	185	185 1/4	185 1/2	185 3/4	186	186 1/4	186 1/2	186 3/4	187	187 1/4	187 1/2	187 3/4	188	188 1/4	188 1/2	188 3/4	189	189 1/4	189 1/2	189 3/4	190	190 1/4	190 1/2	190 3/4	191	191 1/4	191 1/2	191 3/4	192	192 1/4	192 1/2	192 3/4	193	193 1/4	193 1/2	193 3/4	194	194 1/4	194 1/2	194 3/4	195	195 1/4	195 1/2	195 3/4	196	196 1/4	196 1/2	196 3/4	197	197 1/4	197 1/2	197 3/4	198	198 1/4	198 1/2	198 3/4	199	199 1/4	199 1/2	199 3/4	200	200 1/4	200 1/2	200 3/4	201	201 1/4	201 1/2	201 3/4	202	202 1/4	202 1/2	202 3/4	203	203 1/4	203 1/2	203 3/4	204	204 1/4	204 1/2	204 3/4	205	205 1/4	205 1/2	205 3/4	206	206 1/4	206 1/2	206 3/4	207	207 1/4	207 1/2	207 3/4	208	208 1/4	208 1/2	208 3/4	209	209 1/4	209 1/2	209 3/4	210	210 1/4	210 1/2	210 3/4	211	211 1/4	211 1/2	211 3/4	212	212 1/4	212 1/2	212 3/4	213	213 1/4	213 1/2	213 3/4	214	214 1/4	214 1/2	214 3/4	215	215 1/4	215 1/2	215 3/4	216	216 1/4	216 1/2	216 3/4	217	217 1/4	217 1/2	217 3/4	218	218 1/4	218 1/2	218 3/4	219	219 1/4	219 1/2	219 3/4	220	220 1/4	220 1/2	220 3/4	221	221 1/4	221 1/2	221 3/4	222	222 1/4	222 1/2	222 3/4	223	223 1/4	223 1/2	223 3/4	224	224 1/4	224 1/2	224 3/4	225	225 1/4	225 1/2	225 3/4	226	226 1/4	226 1/2	226 3/4	227	227 1/4	227 1/2	227 3/4	228	228 1/4	228 1/2	228 3/4	229	229 1/4	229 1/2	229 3/4	230	230 1/4	230 1/2	230 3/4	231	231 1/4	231 1/2	231 3/4	232	232 1/4	232 1/2	232 3/4	233	233 1/4	233 1/2	233 3/4	234	234 1/4	234 1/2	234 3/4	235	235 1/4	235 1/2	235 3/4	236	236 1/4	236 1/2	236 3/4	237	237 1/4	237 1/2	237 3/4	238	238 1/4	238 1/2	238 3/4	239	239 1/4	239 1/2	239 3/4	240	240 1/4	240 1/2	240 3/4	241	241 1/4	241 1/2	241 3/4	242	242 1/4	242 1/2	242 3/4	243	243 1/4	243 1/2	243 3/4	244	244 1/4	244 1/2	244 3/4	245	245 1/4	245 1/2	245 3/4	246	246 1/4	246 1/2	246 3/4	247	247 1/4	247 1/2	247 3/4	248	248 1/4	248 1/2	248 3/4	249	249 1/4	249 1/2	249 3/4	250	250 1/4	250 1/2	250 3/4	251	251 1/4	251 1/2	251 3/4	252	252 1/4	252 1/2	252 3/4	253	253 1/4	253 1/2	253 3/4	254	254 1/4	254 1/2	254 3/4	255	255 1/4	255 1/2	255 3/4	256	256 1/4	256 1/2	256 3/4	257	257 1/4	257 1/2	257 3/4	258	258 1/4	258 1/2	258 3/4	259	259 1/4	259 1/2	259 3/4	260	260 1/4	260 1/2	260 3/4	261	261 1/4	261 1/2	261 3/4	262	262 1/4	262 1/2	262 3/4	263	263 1/4	263 1/2	263 3/4	264	264 1/4	264 1/2	264 3/4	265	265 1/4	265 1/2	265 3/4	266	266 1/4	266 1/2	266 3/4	267	267 1/4	267 1/2	267 3/4
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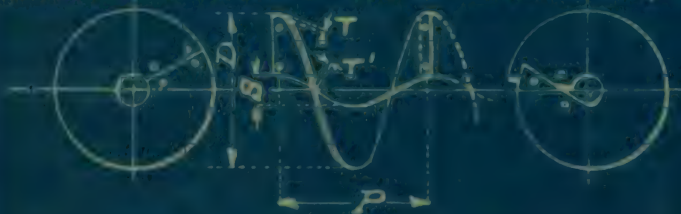
# SPIRAL CONVEYORS.

ADOPTED TO HANDLE SANDY, ROCKY, STICKY MATERIAL. GRAIN, EARTH, MOSS, DIRT ECT.

## DIRECTION OF DRIVE AND CONVEYING MATERIAL.



CONVEYOR FLIGHT CUT FROM SHEET STEEL, BRASS OR COPPER



ARE LAPPED AND RIVETED TOGETHER AND ARE HOLD BY SPECIAL SUPPORTS AND FASTENINGS TO HOLLOW AND SOLID SHAFTS. FIGS. 1 TO 6.

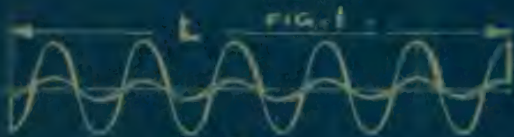


FIG. 2.

FLIGHTS ARE HOT ROLLED OF STEEL STRIP OF TAPERING CROSS SECTION IN ONE CONTINUOUS PIECE.

THERE ARE CAST IRON SPIRAL CONVEYORS MANUFACTURED, FLIGHTS & HOLLOW SHAFT IN ONE PIECE.

L = STANDARD MANUFACTURED LENGTH.

## DIMENSIONS OF CONVEYORS. FIGS.

D	P	L	T	T'	O	I	Cd. & I	D'	A	B	S	R	CAPACITY
3	4	8'-0"	$\frac{7}{16}$	$\frac{3}{16}$	$1\frac{15}{16}$	1	$\frac{3}{16} \times 4$	$\frac{3}{4}$	1	$2\frac{1}{2}$	$1\frac{1}{2}$	250	60
4	5	8'-0"	$\frac{7}{16}$	$\frac{3}{16}$	$1\frac{11}{16}$	$1\frac{1}{4}$	$1" \times 5$	1	$1\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{5}{8}$	220	100
5	$5\frac{1}{2}$	10'-0"	$\frac{7}{16}$	$\frac{3}{16}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{2} \times 5\frac{1}{2}$	$1\frac{1}{2}$	2	4	2	210	200
6	6	10'-0"	$\frac{1}{2}$	$\frac{1}{4}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{2} \times 6$	$1\frac{1}{2}$	2	4	$2\frac{1}{8}$	200	300
"	6	10'-0"	$1\frac{3}{16}$	$\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{2} \times 6$	$1\frac{1}{2}$	2	4	$2\frac{1}{8}$	200	300
7	$7\frac{1}{4}$	10'-0"	$\frac{7}{32}$	$\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{2} \times 7\frac{1}{4}$	$1\frac{1}{2}$	2	4	$2\frac{1}{4}$	190	350
8	$8\frac{3}{16}$	10'-0"	$\frac{3}{16}$	$\frac{3}{8}$	$2\frac{3}{8}$	2	$1\frac{1}{2} \times 8$	$1\frac{1}{2}$	2	4	$2\frac{1}{4}$	180	650
9	$9\frac{1}{8}$	10'-0"	$1\frac{1}{4}$	$\frac{3}{8}$	$2\frac{3}{8}$	2	$1\frac{1}{2} \times 9\frac{1}{8}$	$1\frac{1}{2}$	2	4	$2\frac{3}{8}$	175	1000
"	$9\frac{1}{2}$	10'-0"	$\frac{3}{16}$	$\frac{3}{8}$	$2\frac{7}{8}$	$2\frac{1}{2}$	$2 \times 10$	2	$2\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{5}{16}$	175	1000
10	10	10'-0"	$1\frac{1}{4}$	$\frac{3}{8}$	$2\frac{7}{8}$	2	$2 \times 10$	2	$2\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{5}{16}$	160	1300
12	12	12'-0"	$1\frac{1}{4}$	$\frac{3}{8}$	$2\frac{7}{8}$	$2\frac{1}{2}$	$2 \times 12$	2	$2\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{5}{16}$	160	2000
"	12	12'-0"	$\frac{3}{16}$	$\frac{3}{8}$	$3\frac{7}{16}$	3	$2\frac{7}{16} \times 14$	2	3	$5\frac{1}{4}$	$3\frac{3}{16}$	160	2000
"	12	12'-0"	$\frac{1}{4}$	$\frac{1}{2}$	4	$3\frac{1}{2}$	$3 \times 15$	3	$3\frac{1}{2}$	$5\frac{1}{4}$	4	160	2000
"	12	12'-0"	$\frac{3}{8}$	$\frac{3}{8}$	$3\frac{7}{16}$	3	$2\frac{7}{16} \times 14$	2	$2\frac{1}{2}$	$5\frac{1}{4}$	$3\frac{7}{16}$	160	2000
14	14	12'-0"	$\frac{3}{16}$	$\frac{3}{8}$	$3\frac{7}{16}$	3	$2\frac{7}{16} \times 14$	2	$2\frac{1}{2}$	5	$3\frac{3}{16}$	150	3000
16	12	12'-0"	$\frac{3}{16}$	$\frac{3}{8}$	$2\frac{7}{8}$	$2\frac{1}{2}$	$2 \times 12$	2	3	$5\frac{1}{2}$	$2\frac{15}{16}$	140	5000
"	16	12'-0"	$\frac{1}{4}$	$\frac{1}{2}$	4	$3\frac{1}{2}$	$3 \times 16$	3	3	$5\frac{1}{2}$	4	140	5000
18	18	12'-0"	$5\frac{1}{16}$	$\frac{1}{2}$	$4\frac{1}{2}$	4	$3\frac{1}{2} \times 18$	3	$3\frac{1}{2}$	$6\frac{1}{2}$	$4\frac{3}{16}$	140	6500
"	18	12'-0"	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{7}{16}$	3	$2\frac{7}{16} \times 18$	3	$3\frac{1}{2}$	6	$3\frac{3}{16}$	140	6500

R = REV. P. MINUTE.

COUPLING (Cd. &amp; I) &amp; DRIVING END. BEARING. FLIGHT FASTENINGS.

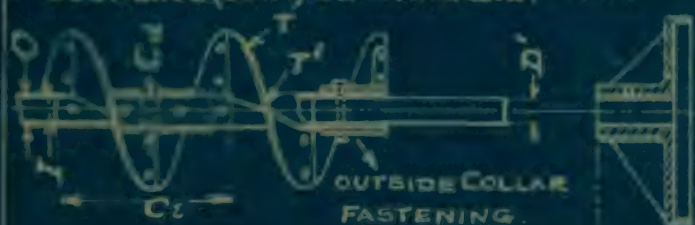


FIG. 3.

BRASS - A -

CAST IRON - B -

CONTINUOUS FLIGHTS FOR CAST IRON - B -

WITH INSIDE COLLAR FASTENING.

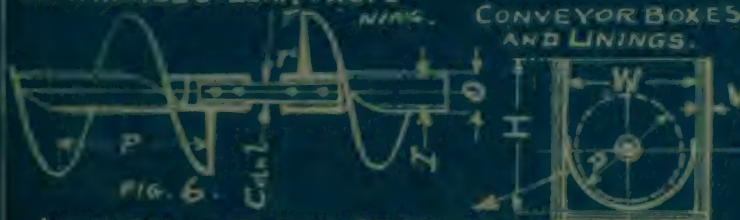


FIG. 6.

LININGS OF SHEET STEEL ARE PLAIN OR PERFORATED TO SUIT CONDITIONS.

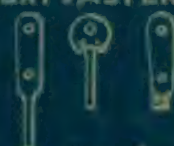


FIG. 4.

WOODEN BOXES.

D	W	H	V
3	4	$4\frac{1}{2}$	$\frac{3}{4}$
4	5	6	$\frac{7}{8}$
5	6	$6\frac{1}{2}$	$\frac{7}{8}$
6	7	$7\frac{3}{4}$	1
7	8	9	$1\frac{1}{4}$
8	9	10	$1\frac{1}{4}$
9	10	11	$1\frac{1}{2}$
10	11	$12\frac{1}{2}$	$1\frac{1}{2}$
12	13	$15\frac{1}{2}$	2
14	15	17	2
16	17	$19\frac{1}{4}$	$2\frac{1}{4}$
18	19	21	$2\frac{1}{2}$









TRANSMISSIONS.  
SHAFTING.

## HORSE POWER OF SHAFTS FOR GIVEN DIAMETERS AND SPEEDS.

DIA. OF SHAFT.	HORSE POWER PER REVOLUT- ION.	REVOLUTIONS PER MINUTE.											
		25	30	35	40	45	50	55	60	65	70	75	80
		HORSE POWER.											
1/2	.0018												
5/8	.0037												
1 1/16	.0048												
3/4	.0062												.5
13/16	.008								.48	.52	.56	.6	.64
7/8	.0099						.5	.54	.59	.64	.69	.74	.79
15/16	.0121				.48	.54	.61	.67	.73	.79	.85	.91	.96
1	.0137			.48	.55	.62	.69	.75	.82	.89	.96	1	1.09
1 1/16	.0165		.5	.57	.66	.74	.8	.91	.99	1.07	1.15	1.24	1.3
1 1/8	.0196	.49	.59	.69	.78	.88	.98	1.08	1.18	1.27	1.37	1.46	1.56
1 3/16	.0242	.60	.73	.85	.97	1.09	1.2	1.3	1.46	1.58	1.7	1.8	1.9
1 1/4	.0269	.67	.81	.94	1.08	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.2
1 5/16	.0311	.78	.93	1.09	1.25	1.4	1.6	1.7	1.86	2	2.17	2.3	2.5
1 3/8	.0358	.89	1.07	1.25	1.4	1.6	1.8	2	2.2	1.4	2.5	2.7	2.9
1 7/16	.0422	1.05	1.27	1.5	1.7	1.9	2.1	2.3	2.5	2.7	3	3.2	3.4
1 1/2	.0465	1.2	1.4	1.6	1.9	2.1	2.3	2.6	2.8	3	3.3	3.5	3.7
1 9/16	.0526	1.3	1.6	1.8	2.1	2.4	2.6	2.9	3.2	3.4	3.7	3.9	4.2
1 5/8	.0588	1.5	1.8	2.1	2.4	2.65	2.9	3.2	3.4	3.8	4.1	4.4	4.7
1 11/16	.067	1.7	2	2.3	2.7	3	3.4	3.7	4	4.4	4.7	5	5.4
1 3/4	.0739	1.8	2.2	2.6	2.9	3.3	3.7	4.1	4.4	4.8	5.1	5.4	5.8
1 13/16	.0821	2.1	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.3	5.7	6.1	6.6
1 7/8	.0909	2.3	2.7	3.2	3.6	4.1	4.5	5	5.5	5.9	6.4	6.8	7.3
1 15/16	.1	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8
2	.1066	2.7	3.2	3.7	4.3	4.8	5.3	5.9	6.4	6.9	7.4	8	8.5
2 1/16	.117	2.9	3.5	4.1	4.7	5.3	5.9	6.4	7	7.6	8.2	8.8	9.4
2 1/8	.1279	3.2	3.8	4.5	5.1	5.8	6.4	7	7.8	8.5	9.1	9.6	10.2
2 3/16	.1425	3.6	4.3	5	5.7	6.4	7.1	7.8	8.6	9.3	9.9	10.7	11.4
2 1/4	.1505	3.8	4.5	5.3	6	6.8	7.5	8.3	9	9.8	10.5	11.3	12
2 5/16	.1648	4.1	4.9	5.8	6.6	7.4	8.2	9.1	9.9	10.7	11.5	12.4	13.2
2 3/8	.1786	4.5	5.4	6.3	7.1	8	8.9	9.8	10.7	11.6	12.5	13.4	14.3

STANDARD LENGTH OF SHAFTS 10. 11. 12



TABLE APPLICABLE TO WELL SUPPORTED LINE  
SHAFTING OF GOOD HAMMERED IRON OR COLD  
ROLLED STEEL FROM WHICH POWER IS TAKEN AT IN-  
TERVALS BY MEDIUM SIZED PULLEYS AND GEARS.

FOR DIAM. OF SHAFTS  $1\frac{1}{2}$ "  $3\frac{1}{2}$ "  $4\frac{1}{2}$ "  $5\frac{1}{2}$ "  
BEARINGS ARE APART 6 8 10 12 FEET.

REVOLUTIONS PER MINUTE.

85 90 100 120 150 175 200 225 250 275 300 325 350 375 400

HORSE POWER.

				.46	.56	.65	.74	.83	.93	1	.54	.59	.63	.68	.72
		.48	.60	.72	.84	.96	1.08	1.2	1.32	1.44	1.56	1.68	1.8	1.9	2.0
.53	.56	.62	.76	.93	1.09	1.2	1.4	1.55	1.7	1.86	2	2.17	2.3	2.5	2.6
.68	.72	.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4
.84	.89	.99	1.13	1.5	1.7	2	2.2	2.5	2.7	3	3.2	3.5	3.7	4	4.2
1.02	1.09	1.2	1.4	1.7	2.1	2.4	2.6	3.1	3.4	3.6	4	4.3	4.7	5	5.2
1.16	1.2	1.37	1.7	2	2.4	2.75	3.1	3.4	3.8	4.1	4.5	4.8	5.1	5.5	5.8
1.4	1.5	1.67	2.1	2.5	2.9	3.3	3.7	4.1	4.5	5	5.4	5.8	6.2	6.6	6.9
1.7	1.8	2	2.4	2.9	3.4	3.9	4.3	4.9	5.4	5.9	6.4	6.9	7.4	7.9	8.3
2	2.2	2.4	3.1	3.7	4.3	4.9	5.5	6.1	6.6	7.3	7.9	8.5	9	9.7	10.2
2.3	2.5	2.7	3.4	4	4.7	5.4	6	6.7	7.4	8.1	8.7	9.4	10.1	10.8	11.4
2.7	2.9	3.1	3.9	4.7	5.4	6.2	7	7.8	8.6	9.3	10.1	10.9	11.7	12.5	13.2
3	3.2	3.6	4.5	5.4	6.3	7.2	8	9	9.8	10.7	11.6	12.5	13.4	14.3	15.1
3.6	3.8	4.2	5.3	6.4	7.4	8.5	9.5	10.5	11.6	12.7	13.7	14.8	15.8	16.9	17.7
3.9	4.1	4.7	5.8	7	8.1	9.3	10.5	11.6	12.8	13.9	15.1	16.3	17.3	18.6	19.5
4.5	4.7	5.3	6.6	7.9	9.2	10.5	11.8	13.2	14.5	15.8	17.1	18.4	19.7	21	22
5	5.3	5.9	7.4	8.8	10.3	11.8	12.2	14.7	16.2	17.6	19.1	20.6	22	23.5	24.8
5.7	6	6.7	8.4	10.1	11.7	13.4	15.1	16.7	18.4	20.1	21.8	23.4	25.1	26.8	28.3
6.3	6.7	7.4	9.2	11.1	12.8	14.8	16.5	18.5	20.2	22.2	24	25.8	27.5	29.6	31.2
7	7.4	8.2	10.3	12.3	14.4	16.4	18.5	20.5	22.6	24.6	26.7	28.7	30.8	32.8	34.8
7.7	8.2	9.1	11.4	13.6	15.9	18.2	20.4	22.7	25.2	27.3	29.5	31.8	34.1	36.4	38.6
8.5	9	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	37.5	40	42.5
9.1	9.6	10.7	13.3	16	18.6	21.3	24.1	26.7	29.3	32	34.6	37.3	40	42.6	45.1
10	10.5	11.7	14.6	17.5	20.5	23.4	26.3	29.3	32.2	35.1	38	41	43.9	46.8	49.7
10.9	11.5	12.8	16	19.2	22.4	25.6	28.8	32	35.2	38.4	41.6	44.8	48	51.2	54.4
12.1	12.8	14.3	17.8	21.4	24.9	28.5	32.1	35.6	39.2	42.7	46.3	49.8	53.4	57	60.2
12.8	13.5	15	18.8	22.6	26.3	30.1	33.9	37.6	41.4	45.2	48.9	52.7	56.4	60.2	63.9
14	14.8	16.5	20.6	24.7	28.8	33	37.1	41.2	45.3	49.4	53.6	57.6	61.8	65.9	69.9
15.2	15.9	17.9	22.3	26.8	31.2	35.7	40.2	44.7	49.1	53.6	58	62.5	67	71.4	75.8

13. 14. 15. 16. 17. 18. 19. 20. 22 AND 24 FEET.







## SHAFTING.

DIAM. OF SHAFT. INCHES.	HORSE POWER P.E. REVOLUTION	REVOLUTIONS PER MINUTE.											
		25	30	35	40	45	50	55	60	65	70	75	80
		HORSE POWER.											
2 7/16	.195	4.9	5.9	6.8	7.8	8.8	9.8	10.7	11.7	12.7	13.9	14.8	15.6
2 1/2	.2083	5.2	6.3	7.3	8.3	9.4	10.4	11.5	12.6	13.6	14.6	15.6	16.7
2 9/16	.2243	5.6	6.7	7.9	9	10.1	11.2	12.4	13.5	14.6	15.7	16.8	17.9
2 5/8	.241	6	7.2	8.4	9.6	10.9	12.1	13.3	14.3	15.5	16.9	18.1	19.3
2 11/16	.26	6.5	7.8	9.1	10.4	11.7	13	14.3	15.6	16.9	18.2	19.5	20.8
2 3/4	.2772	6.9	8.3	9.7	11.1	12.5	13.9	15.2	16.6	18	19.4	20.8	22.2
2 13/16	.2966	7.4	8.9	10.4	11.9	13.3	14.8	16.3	17.8	19.3	20.8	22.2	23.7
2 7/8	.3168	7.9	9.5	11.1	12.7	14.3	15.8	17.4	19	20.6	22.2	23.8	25.3
2 15/16	.3375	8.4	10.1	11.8	13.5	15.2	16.9	18.6	20.3	22	23.6	25.3	27
3	.36	9.0	10.9	12.8	14.4	16.3	18.6	20.5	21.6	23.5	25.2	27.1	28.8
3 1/16	.3779	9.5	11.3	13.2	15.1	17	18.9	20.8	22.7	24.6	26.5	28.3	30.2
3 1/8	.4016	10	12.1	14.1	16.1	18.1	20.1	22.1	24.1	26.1	28.1	30.1	32.2
3 3/16	.4251	10.6	12.8	14.8	17	19.1	21.3	23.4	25.6	27.7	29.7	31.9	34
3 1/4	.4516	11.3	13.5	15.8	18.1	20.3	22.6	24.8	27.1	29.4	31.6	33.9	36.1
3 5/16	.4782	11.9	14.3	16.7	19.1	21.5	23.7	26	28.7	31	33.5	35.8	38.3
3 3/8	.5058	12.6	15.2	17.7	20.2	22.8	25.3	27.8	30.3	32.9	35.4	37.9	40.5
3 7/16	.5345	13.4	16	18.7	21.4	24.1	26.7	29.4	32.1	34.7	37.4	40.1	42.8
3 1/2	.5642	14.1	17	19.8	22.6	25.4	28.2	31	33.9	36.7	39.5	42.3	45.1
3 9/16	.5974	14.9	18	20.9	23.9	26.9	29.9	32.9	35.8	38.8	41.8	44.8	47.8
3 5/8	.6267	15.7	18.9	23.1	25	28.2	31.3	34.5	37.6	40.7	43.8	47	50.2
3 11/16	.6597	16.5	19.6	22.9	26.4	29.7	33	36.3	39.6	42.9	46.2	49.5	52.8
3 3/4	.6938	17.3	20.8	24.3	27.8	31.3	34.7	38.2	41.6	45.1	48.6	52	55.6
3 13/16	.7291	18.3	21.8	25.4	29.2	32.8	36.5	40.2	43.6	47.3	51.1	54.7	58.4
3 7/8	.767	19.2	23	26.8	30.7	34.5	38.8	42.2	46	49.8	53.4	57.5	61.4
3 15/16	.8	20	24	28	32	36	40	44	48	52	56	60	64
4	.8311	20.8	25	29.1	33.3	37.5	41.5	45.7	50	54	58.2	62.3	66.4
4 1/16	.8707	21.8	26.1	30.5	34.8	39.2	43.5	47.9	52.2	56.6	61	65.3	69.6
4 1/8	.9115	22.8	27.3	31.9	36.5	41.1	45.6	50.1	54.6	59.2	63.8	68.4	73
4 3/16	.9406	23.5	28.2	32.9	37.6	42.3	47	51.7	56.4	61.1	65.8	70.5	75.2
4 1/4	.9839	24.6	29.4	34.3	39.4	44.3	49.2	54.1	58.8	63.7	68.9	73.5	78.8
4 5/16	1.0415	26	31.2	36.5	41.7	46.9	52.1	57.3	62.4	67.6	72.9	78.1	83.4
4 3/8	1.0875	27.2	32.6	38.1	43.5	49	54.4	59.8	65.2	70.6	76.1	81.5	87
4 7/16	1.114	28.5	34.2	39.9	45.6	51.2	55.7	61.3	66.4	74	78	85.4	91.2
4 1/2	1.1834	29.8	35.5	41.4	47.3	53.2	59.2	65.1	71	76.9	82.8	88.7	94.6
4 9/16	1.2464	31.2	37.4	43.6	49.9	56.1	62.3	68.6	74.8	81	87.2	93.4	99.1
4 5/8	1.2978	32.4	38.9	45.4	51	57.4	64.9	71.4	77.8	84.3	90.8	97.3	102
4 11/16	1.3364	33.4	40.1	46.8	53.5	60.2	66.8	73.5	80	86.7	93.5	100.3	107



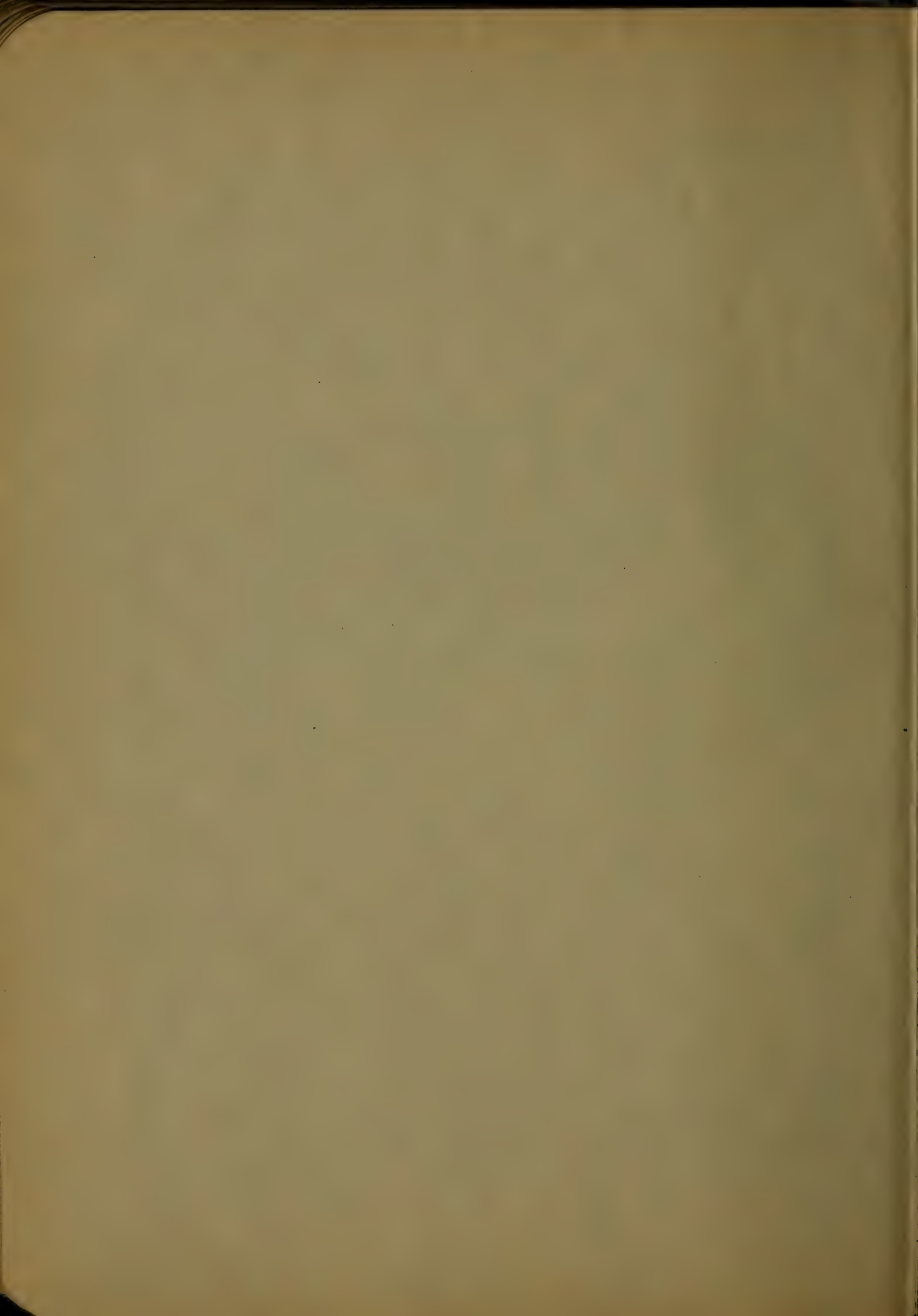
## SHAFTING.

## REVOLUTIONS PER MINUTE.

85	90	100	125	150	175	200	225	250	275	300	325	350	375	400
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## HORSE POWER.

16.6	17.6	19.5	24.4	29.3	34.1	39	44.1	48.7	53.8	58.5	63.6	68.2	73.3	78
17.7	18.8	20.8	26	31.2	35.6	41.7	46.9	52.1	57.3	62.8	68	73.2	78.3	83.3
19.2	20.2	22.4	28	33.6	39.3	44.9	50.3	56.1	61.7	67.3	72.9	78.5	84.1	89.7
20.5	21.9	24.1	30.1	36.2	42.2	48.2	54.2	60.3	66.3	72.3	78.3	84.4	90.4	96.4
22.1	23.9	26	32.5	39	43.5	52	58.5	65	71.5	78	85.5	92	97.5	104
23.6	25	27.7	34.7	41.6	48.5	55.4	62.4	69.3	76.2	83.2	90.1	97	104	110.3
25.2	26.7	29.7	37.1	44.5	51.9	59.3	66.7	74.2	81.6	89	93.3	103.8	111.1	118.6
26.9	28.5	31.7	39.6	47.5	55.4	63.4	71.3	79.2	87.1	95	103	110.9	118.8	126.7
28.7	30.4	33.8	42.2	50.6	59.1	67.5	75.9	84.4	92.8	101.3	109.7	118.2	126.6	135
30.7	31.9	36	45.1	54.6	61.1	72	81.1	90.6	101.1	109.2	117.1	127.8	135.1	144
32.1	34	37.3	47.2	56.7	66.1	75.6	85	94.5	104	113.4	122.8	132.3	141.7	151.1
34.2	36.2	40.2	50.2	60.2	70.3	80.3	90.3	100.4	110.4	120.5	130.5	140.5	150.6	160.6
36.1	38.2	43	53.6	64.4	75.1	85.8	96.6	107.3	116.9	128.7	138.1	150.3	159.4	171.6
38.4	40.6	45.2	56.5	67.7	79	90.3	101.6	112.9	124.2	135.5	146.8	158.1	169.4	180.6
40.6	43	47.8	59.8	71.5	83.7	95.6	107.6	119.3	131.5	143.5	155.4	167.1	179.3	191.3
44	45.6	50.6	63.2	75.9	88.5	101.2	113.8	126.5	139.1	151.7	164.4	177	189.7	202.4
45.4	48.2	53.6	67	79.4	93.8	107.2	120.1	134	147	158.8	173.7	187.6	200.4	214.4
48	50.8	56.4	70.5	84.6	98.7	112.8	127	141	155.2	169.3	183.4	197.5	211.6	226
50.8	53.8	59.7	74.7	89.6	104.5	119.5	134.4	149.4	164.3	179.2	194.2	209.1	224.1	238
53.3	56.4	62.7	78.3	94	108.7	125.3	141.1	156.7	172.4	188	203.7	219.3	235	250.6
56.1	59.4	65.9	82.4	97.9	115.4	131.8	148.3	164.8	181.4	195.7	214.3	230.7	247.4	263.8
59.1	62.6	69.4	86.7	104.1	111.4	138.8	156.1	176.9	190.8	208.2	225.1	242.5	259.7	277.6
62.5	65.6	72.9	91.1	108.5	127.6	145.8	164	182.5	200	217.7	235.9	254.2	273.8	291.6
65.2	69	76.7	95.9	115.1	134.2	153.4	172.6	191.7	211	230.1	249.3	268.5	287.6	306.8
68	72	80	100	120	140	160	180	200	220	240	260	280	300	320
70.8	75	83.1	103.9	124.6	145.4	166.2	187.1	207.8	228.6	249.3	270.1	290.8	311.6	333
73.9	78.4	87.1	108.8	130.7	152.4	174.2	196	217.7	239.4	261.3	283	304.7	326.5	348.3
75.5	82.2	91.2	114	136.7	159.8	182.3	205.1	227.8	250.7	273.4	296.2	319.2	341.8	364.6
79.9	84.6	94.1	117.6	141.1	164.6	188.1	211.6	235.2	258.7	282.2	305.7	329.2	352.7	376.2
83.7	88.6	98.4	123	147	172.2	196.7	221.4	246	270.6	294.1	318.7	344.4	367.9	393.6
88.6	93.8	104.2	130.2	156.2	182.3	208.3	234.3	260.4	286.4	312.4	338.5	365.3	390.6	416.6
92.4	98	108.3	135.9	163.1	190.3	217.5	244.7	271.9	299.1	326.2	353.4	380.6	407.8	435
96.3	102.4	113.9	142.4	170.8	199.3	227.8	256.2	284.7	306.4	341.7	369.6	398.6	425.3	455.6
100.5	106.4	118.3	148	177.5	207.1	236.7	266.3	297.9	325.4	355	384.6	414.2	443.8	473.4
106	112.2	124.6	155.8	186.9	218.1	249.3	280.4	311.6	342.8	373.9	405.1	436.3	467.4	498.6
108.5	114.8	129.8	162.2	194.7	227.1	259.5	292	324.4	356.9	389.4	421.8	453.6	486.5	510.1
113.6	120.4	133.6	167	200.5	233.9	267.7	300.7	334.1	364.5	400.3	434.3	467.7	501.1	534.6







# 107 SHAFTING.

DIAM. OF SHAFT. INCHES.	HORSE POWER PER REVOLUTION	REVOLUTIONS PER MINUTE.											
		25	30	35	40	45	50	55	60	65	70	75	80
		HORSE POWER.											
4 <sup>3</sup> / <sub>4</sub>	1.3918	34.9	41.8	48.7	55.7	62.6	69.6	76.5	83.5	90.5	97.4	104.3	111.4
4 <sup>13</sup> / <sub>16</sub>	1.4476	36.2	43.4	50.7	57.9	65.1	72.4	79.6	86.8	94	101.3	108.5	115.8
4 <sup>7</sup> / <sub>8</sub>	1.5046	37.6	45.1	52.7	60.2	67.7	75.2	82.6	90.2	97.7	105.3	112.8	120.2
4 <sup>15</sup> / <sub>16</sub>	1.5625	39.1	46.9	54.7	62.5	70.3	78.1	85.9	93.7	101.5	109.4	117.2	125
5	1.6246	40.6	48.7	56.9	64.9	73.	81.2	89.4	97.4	105.5	113.7	121.8	130
5 <sup>1</sup> / <sub>16</sub>	1.685	42.3	50.6	58.9	67.4	75.9	84.2	92.7	101.2	109.7	117.9	126.3	134.8
5 <sup>1</sup> / <sub>8</sub>	1.7482	43.7	52.4	61.2	69.8	78.6	87.4	96.2	104.8	113.5	122.4	131	139.6
5 <sup>3</sup> / <sub>16</sub>	1.8129	45.3	54.4	63	72.5	81.6	90.6	100	108.8	117.8	126	136	145
5 <sup>1</sup> / <sub>2</sub>	1.8792	46.9	56.4	65.8	75.1	84.4	94	103.4	112.8	122	131.6	141	150
5 <sup>9</sup> / <sub>16</sub>	1.949	48.7	58.5	68.2	77.9	87.7	97.5	107.3	116	126.6	136.4	146	155.8
5 <sup>3</sup> / <sub>8</sub>	2.0167	50.4	60.5	70.5	80.7	90.7	100.8	110.8	121	131	141	151	161.4
5 <sup>7</sup> / <sub>16</sub>	2.0877	52.2	62.6	73	83.2	93.9	104.3	114.7	125	135.4	146	156.8	166.4
5 <sup>1</sup> / <sub>2</sub>	2.1607	54	64.8	75.6	86.4	97.2	108	118.8	129.6	140.4	151.2	162	172.8
5 <sup>9</sup> / <sub>16</sub>	2.2352	55.8	67.0	78.2	89.4	100.5	111.7	122.8	134	145.2	156.4	167.6	178.8
5 <sup>5</sup> / <sub>8</sub>	2.3114	57.7	69.4	81.6	92.4	104	115.6	127.1	138.8	150	163.2	173.8	184.1
5 <sup>11</sup> / <sub>16</sub>	2.3891	59.7	71.7	83.8	95.6	107.5	119.5	131.4	143.4	155.3	167.2	179.2	191.2
5 <sup>3</sup> / <sub>4</sub>	2.4676	61.8	74	86.3	98.6	111	123.4	135.7	148	160.4	172.6	185	197.2
5 <sup>13</sup> / <sub>16</sub>	2.55	63.8	76.5	89.2	102	114.7	127.5	140.3	153	165.8	178.4	191.2	204
5 <sup>7</sup> / <sub>8</sub>	2.6328	65.8	78.9	92	105.2	118.3	131.5	144.6	157.8	171	184	197.2	210.4
5 <sup>15</sup> / <sub>16</sub>	2.7185	67.9	81.6	95	108.8	122.4	136	149.6	163	176.7	190	204	217.6
6	2.8051	70.1	84.1	98	112.2	126.1	140.2	154.2	168.2	182.3	196	210.5	224.4
6 <sup>1</sup> / <sub>16</sub>	3.037	75.8	91.2	106.4	121.6	136.8	152	167.2	182.4	197.4	212.8	228	243.2
6 <sup>1</sup> / <sub>8</sub>	3.4202	85.5	102.6	119.6	136.8	153.5	171	188	205.2	222.3	239	256.5	273.6
6 <sup>1</sup> / <sub>4</sub>	3.6649	91.6	109.9	128	146.6	164.8	183.2	201.5	219.8	238.2	256	274.7	293.2
6 <sup>3</sup> / <sub>8</sub>	4.2807	106.5	128.4	149	161.2	188.5	214	235.4	256.8	268	292	321	322.4
7 <sup>1</sup> / <sub>16</sub>	4.6413	116	139.2	162	185.6	208	232	255.2	278.4	301.6	324	348	371.2
7 <sup>1</sup> / <sub>8</sub>	5.1434	128.3	154.2	179	203.6	231	257	282.3	308.4	332	358	385	407.2
7 <sup>3</sup> / <sub>16</sub>	5.6789	141.9	170.4	199	227.2	255	284	312.2	340.8	369	398	426	454.4
7 <sup>1</sup> / <sub>2</sub>	6.2386	155.5	187.2	218	249.6	280.5	312	343	374.4	405.4	436	468	499.2
8 <sup>1</sup> / <sub>16</sub>	7.5084	187.7	225.3	262	280.4	338	375	412.5	450.6	468	524	563	561
8 <sup>1</sup> / <sub>8</sub>	8.1958	204.5	246	287	328	369	410	451	492	532.8	574	618	656
8 <sup>3</sup> / <sub>16</sub>	8.9239	223	267.6	312	356.8	401	446	490.6	535	579.6	624	669	713
9 <sup>1</sup> / <sub>16</sub>	9.8901	247.2	296.7	346	395.1	445	494.5	544	593	642.8	692	741.2	791
9 <sup>1</sup> / <sub>8</sub>	10.9408	273	328.2	373	437.6	492	547	601.7	656	710.6	766	820.5	875
10 <sup>1</sup> / <sub>16</sub>	11.848	296	358.8	414	474	533	592.5	652	711	770	828	886.5	948
10 <sup>1</sup> / <sub>8</sub>	13.0851	322	392.7	458	523.6	589	654.5	720	785	846	916	981.5	1047
11 <sup>1</sup> / <sub>16</sub>	14.5739	364	437	510	582.8	655	728.5	801.4	874	947	1020	1092	1165
11 <sup>1</sup> / <sub>8</sub>	17.012	420	510.3	595	680	765	850.5	936	1020	1100	1190	1275	1360
12 <sup>1</sup> / <sub>16</sub>	19.2407	481	577.2	673	770	866	962	1058	1154	1250	1346	1443	1540



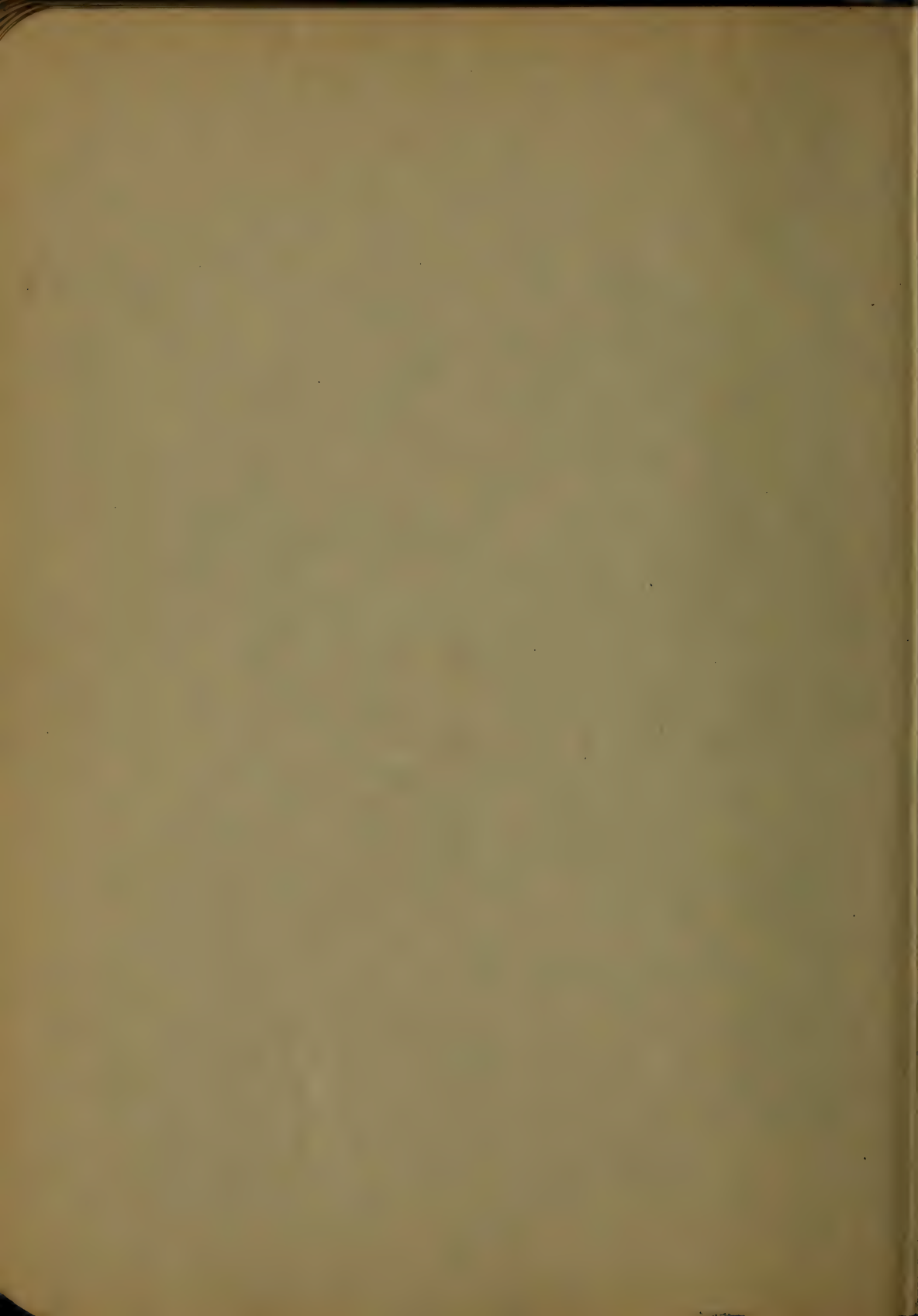
## SHAFTING.

REVOLUTIONS PER MINUTE.

85	90	100	125	150	175	200	225	250	275	300	325	350	375	400
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## HORSE POWER.

118.4	125.2	139.2	174	208.7	243.6	272.4	313.1	349	372.7	417.5	452.1	487.1	517	556.7
123	130.2	144.3	181	217.1	253.3	289.3	325.7	362	398	434.3	470.4	506.7	543	579
127.7	135.4	150.5	188.1	225.7	263.3	300.9	338.5	376.2	413.8	451.4	489	526	564	601.8
132.8	140.6	156.3	195.3	234.4	273.4	312.5	351.5	390.6	431.7	468.7	507.8	546.8	586	625
138.1	146	162.5	203.1	243.7	284.3	324.9	365.3	406.2	446.7	487	528	568.6	609	650
143.2	151.8	168.5	211	252.7	294.7	337	379	422	465.3	505.5	548	589.4	631.5	674
148.3	157.2	174.8	218.5	262	305.7	349.6	395	437	480.7	524	568	611.3	655	698
154	163.2	181.3	226.5	272	317	362.6	408	453.1	498.3	544	589	634.2	680	726
159.4	168.3	188	235	282	329	375.8	423	470	516	564	611	658	705	751
165.5	175.5	195	243.7	292	341.2	389.2	438	487.5	535.7	585	634	682.5	730	779
171.4	181.5	201.7	252	302.3	352.5	403.7	453	504	554	605	655	705.6	755	807
176.8	187.8	208.7	260.7	313	365	416.2	470	521.5	574	626	678	720	772.5	832
183.4	194.4	216.1	270	324	378	432	486	540	594	648	702	756	810	864
190	201	223.5	279	335	391	447	502	558.5	613.8	670	726	782	837.5	894
196	208.2	231.2	289	347	404.5	462	520	578	632.5	694	752	809	867.5	924
202	215	239	298.7	358.3	418.3	478	538	597.5	657	717	777	836.5	896	956
209.5	222	246.8	308.5	370	431.9	493	555	617	680	740	802	863.5	925	986
216.7	229.5	255	318.7	382.5	446.5	510	574	637.5	702	765	829	892.5	956	1020
223.5	236.7	263	328.7	394.5	460	526	592	657.5	724	789	855	920.5	986	1051
231	244.8	272	340	408	476	544	612	680	747	816	884	952	1020	1088
238.4	252.3	280.5	350.5	420.5	490	561	631	701	771	841	911	981	1052.5	1122
245.4	273.4	304	380	456	532	608	684	760	834	912	988	1064	1140	1216
250.7	307	342	427.5	513	598	684	769	855	940	1026	1112	1197	1282.5	1368
311.5	329.7	366.5	458	549.5	641	733	824	916	1008	1099	1191	1282	1373	1466
343.4	377	428	535	642	749	856	963	1070	1175	1284	1391	1498	1605	1612
404	417.4	464	580	696	812	928	1064	1160	1276	1392	1418	1624	1740	1856
433	462	514	643	771	899	1018	1156	1285	1414	1542	1670	1799	1927	2036
483	518.3	568	710	852	994	1136	1278	1420	1561	1704	1846	1988	2130	2272
530	561.4	624	780	936	1092	1248	1404	1560	1714	1872	2028	2184	2340	2496
598	676	751	937	1126	1312	1402	1689	1875	1874	2253	2441			
647	738	820	1025	1230	1435	1640	1845	2050	2059	2460				
758	802	892	1115	1338	1561	1784	2007	2230	2253					
840	890	989	1236	1483	1730	1978	2224	2473						
930	985	1094	1491	1641	1864	2188	2461							
1007	1066	1185	1636	1773	2073	2370								
1113	1178	1309	1821	1963	2290									
1238	1311	1457	2121	2185										
1445	1531	1721	2450											
1636	1732	1924												





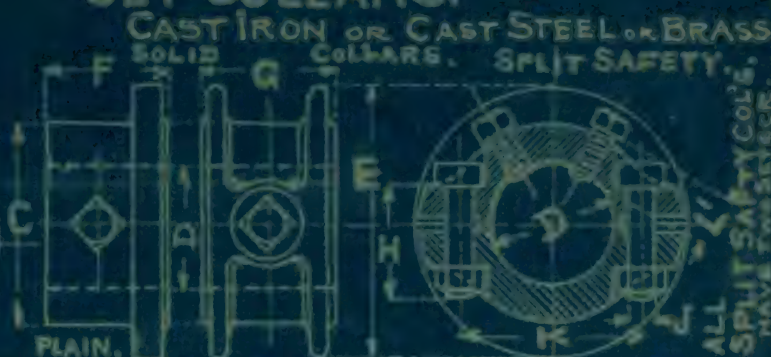


# HORSE POWER PER REVOLUTION TRANSMITTED BY SHAFTS UNDER VARIOUS CONDITIONS. COMMERCIAL SIZES.

DIAMETER OF SHAFT.	PRIME MOVER	SECOND MOVERS.			BEARINGS	
	JACK-SHAFT, CRANK-SH'T, E.C.	HEAVY LINE-SHAFT	COMMON LINE-SHAFT SEE PAGE	JOURNALS FOR OVERHUNG GEARING.	STAND PILLOW BLOCK LENGTH INCHES.	APPART FEET.
1 5/16	.0036	.0061	.0121	.0091	3 3/4	5'-0"
1 3/16	.0073	.0121	.0242	.0181	4 3/4	5'-6"
1 7/16	.0127	.0211	.0422	.0316	5 3/4	6'-0"
1 11/16	.0134	.0335	.067	.0335	7	"
1 5/8	.0360	.05	.1000	.08	7 1/2	6'-6"
2 3/16	.0628	.07135	.1425	.107	8 5/8	"
2 7/16	.0585	.0975	.195	.1465	9 5/8	7'-0"
2 11/16	.078	.13	.26	.195	10 7/8	"
2 5/8	.1013	.16875	.3375	.2065	11 3/4	8'-0"
3 3/16	.1275	.21255	.4251	.3189	12 3/4	"
3 7/16	.1604	.26725	.5345	.401	13 1/2	8'-6"
3 11/16	.1980	.32985	.6597	.495	14 3/4	"
3 5/8	.24	.4	.8	.6	15 5/8	10'-0"
4 3/16	.2822	.4703	.9406	.7055	15 7/8	"
4 7/16	.3342	.557	1.114	.8355	15 3/4	10'-6"
4 11/16	.4009	.6682	1.3364	1.0025	16	"
4 5/8	.4688	.78125	1.5625	1.172	16 3/4	12'-0"
5 3/16	.5544	.90645	1.8129	1.386	17 1/2	"
5 7/16	.6263	1.0419	2.0877	1.5657	18	12'-6"
5 11/16	.7167	1.1945	2.3891	1.7917	19	"
5 5/8	.8156	1.3593	2.7155	2.078	19 3/4	"
6 3/16	.9111	1.5185	3.037	2.555	20 1/4	"
6 7/16	1.0261	1.7101	3.4202	2.565	20 1/2	13'-0"
6 5/8	1.2842	2.1403	4.2807	3.2105	23	"
7 3/16	1.5420	2.5717	5.1434	3.855	24 1/2	"
7 5/8	1.8715	3.1193	6.2386	4.679	26	"
8 3/16	2.2525	3.7542	7.5024	5.6315	27 1/2	13'-6"
8 5/8	2.6772	4.4619	8.9239	6.693	29	"
9 3/16	2.9670	4.9450	9.8901	7.4175	30	"
9 5/8	3.2823	5.4704	10.9403	8.0706	32	"
10 3/16	3.9255	6.5436	13.0851	9.8137	34	14'-0"
11 3/16	5.1036	8.506	17.012	12.759	36	"
12 3/16	5.7782	9.6203	19.2407	14.4305	38	"



## SET COLLARS.

WROUGHT IRON  
LOOSE COLLAR.ALL  
SPLIT SAFETY COLLARS  
HAVE TWO SET SCREWS.

DIAMETER OF SHAFT. D	DIAMETER OF SET SCREW.	NUMBER OF SET SCREWS.	DIMENSION OF COLLARS IN INCHES.										
			WROUGHT IRON COLLAR			CAST IRON, STEEL OR BRASS COLLARS. PLAIN SOLID AND SPLIT.							
			A	B	L	C	E	F	G	H	J	K	L
5/16	5/16	1	1 1/2	7/8	3/8	1 1/2	2 3/4	1 1/4	1 3/8	1 5/8	5/16	1 3/8	3/8
3/8	3/8	1	1 3/8	1 1/8	1/2	2	3 1/4	1 3/8	1 5/8	2 1/8	3/8	1 3/4	1/2
1/2	1/2	1	2 1/8	1 1/4	5/8	2 3/8	3 3/4	1 11/16	1 7/8	2 1/8	1/2	2 1/8	5/8
5/8	5/8	1	2 1/2	1 3/8	3/4	2 5/8	4 1/8	1 13/16	2 1/8	2 3/8	"	2 1/2	"
3/4	3/4	1	3 1/8	1 1/2	3/4	3 1/4	4 1/2	1 7/8	2 1/4	2 3/8	"	3 1/4	3/4
7/8	7/8	1	3 1/2	1 5/8	7/8	3 3/8	5 1/8	1 7/8	2 1/2	2 1/2	"	3 3/8	"
1 1/16	1 1/16	1	3 3/4	1 3/4	1	4 1/8	6 1/8	2	2 3/8	3 1/8	5/8	4 1/8	"
1 1/8	1 1/8	1	4 1/8	1 7/8	1 1/8	4 3/4	7	2	2 1/2	3 1/8	"	4 3/4	"
1 1/4	1 1/4	1	4 1/2	2	1 1/4	5 1/4	7 1/4	2	2 11/16	3 1/8	"	5 1/8	"
1 3/8	1 3/8	1	5 1/8	2 1/8	1 1/2	5 3/8	7 5/8	2	2 3/4	3 1/8	"	5 3/8	7/8
1 1/2	1 1/2	1	5 1/2	2 1/4	1 3/8	6 1/8	8 1/8	2 1/4	2 11/16	3 1/8	"	6	"
1 5/8	1 5/8	1	5 3/4	2 1/2	1 1/2	6 3/8	8 3/8	2 1/4	2 3/4	3 1/8	5/8	6 3/8	1
1 3/4	1 3/4	1	6 1/8	2 3/8	1 3/4	7 1/8	9 1/8	3	3 1/8	3 1/8	"	7 1/8	"
1 7/8	1 7/8	1	6 1/2	2 1/2	1 3/4	7 1/2	9 3/8	3	3 1/4	3 1/8	"	7 1/2	1 1/8
2	2	1	6 3/4	2 3/4	1 3/4	8	10 1/8	3 1/4	3 1/4	3 1/8	"	8 1/8	"
2 1/16	2 1/16	1	7 1/8	2 3/4	1 3/4	8 1/4	10 3/8	3 1/4	3 1/4	3 1/8	3/4	8 3/8	"
2 1/8	2 1/8	1	7 1/4	2 3/4	1 3/4	8 3/8	10 3/8	3 1/4	3 1/4	3 1/8	"	8 3/8	"
2 1/4	2 1/4	1	7 1/2	2 3/4	1 3/4	8 1/2	10 3/8	3 1/4	3 1/4	3 1/8	"	9	"
2 3/8	2 3/8	1	7 3/4	2 3/4	1 3/4	8 3/4	10 3/8	3 1/4	3 1/4	3 1/8	"	9 3/8	"
2 1/2	2 1/2	1	8	2 3/4	1 3/4	9	11 1/8	3 1/2	3 1/4	3 1/8	"	10 1/8	1 1/4
2 5/8	2 5/8	1	8 1/4	2 3/4	1 3/4	9 1/4	11 1/8	3 1/2	3 1/4	3 1/8	"	10 1/2	"
2 3/4	2 3/4	1	8 1/2	2 3/4	1 3/4	9 3/8	11 1/8	3 1/2	3 1/4	3 1/8	"	10 3/4	"
2 7/8	2 7/8	1	8 3/4	2 3/4	1 3/4	9 3/4	11 3/8	3 1/2	3 1/4	3 1/8	"	11 1/8	1 1/2
3	3	1	8 1/2	2 3/4	1 3/4	10	12 1/8	3 1/2	3 1/4	3 1/8	"	11 1/2	"
3 1/16	3 1/16	1	8 3/4	2 3/4	1 3/4	10 1/4	12 1/8	3 1/2	3 1/4	3 1/8	"	11 3/4	"
3 1/8	3 1/8	1	8 3/4	2 3/4	1 3/4	10 1/2	12 1/8	3 1/2	3 1/4	3 1/8	"	12 1/8	1 5/8
3 1/4	3 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	12 1/2	"
3 1/2	3 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	13	"
3 3/4	3 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	13 1/2	"
3 7/8	3 7/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	14	"
4	4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	14 1/2	"
4 1/16	4 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	15	"
4 1/8	4 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	15 1/2	"
4 1/4	4 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	16	"
4 1/2	4 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	16 1/2	"
4 3/4	4 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	17	"
4 7/8	4 7/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	17 1/2	"
5	5	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	18	"
5 1/16	5 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	18 1/2	"
5 1/8	5 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	19	"
5 1/4	5 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	19 1/2	"
5 1/2	5 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	20	"
5 3/4	5 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	20 1/2	"
5 7/8	5 7/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	21	"
6	6	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	21 1/2	"
6 1/16	6 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	22	"
6 1/8	6 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	22 1/2	"
6 1/4	6 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	23	"
6 1/2	6 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	23 1/2	"
6 3/4	6 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	24	"
6 7/8	6 7/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	24 1/2	"
7	7	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	25	"
7 1/16	7 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	25 1/2	"
7 1/8	7 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	26	"
7 1/4	7 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	26 1/2	"
7 1/2	7 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	27	"
7 3/4	7 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	27 1/2	"
8	8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	28	"
8 1/16	8 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	28 1/2	"
8 1/8	8 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	29	"
8 1/4	8 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	29 1/2	"
8 1/2	8 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	30	"
8 3/4	8 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	30 1/2	"
8 7/8	8 7/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	31	"
9	9	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	31 1/2	"
9 1/16	9 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	32	"
9 1/8	9 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	32 1/2	"
9 1/4	9 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	33	"
9 1/2	9 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	33 1/2	"
9 3/4	9 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	34	"
10	10	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	34 1/2	"
10 1/16	10 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	35	"
10 1/8	10 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	35 1/2	"
10 1/4	10 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	36	"
10 1/2	10 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	36 1/2	"
10 3/4	10 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	37	"
11	11	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	37 1/2	"
11 1/16	11 1/16	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	38	"
11 1/8	11 1/8	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	38 1/2	"
11 1/4	11 1/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	39	"
11 1/2	11 1/2	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	39 1/2	"
11 3/4	11 3/4	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	40	"
12	12	1	8 3/4	2 3/4	1 3/4	10 3/4	12 1/8	3 1/2	3 1/4	3 1/8	"	40 1/2	"





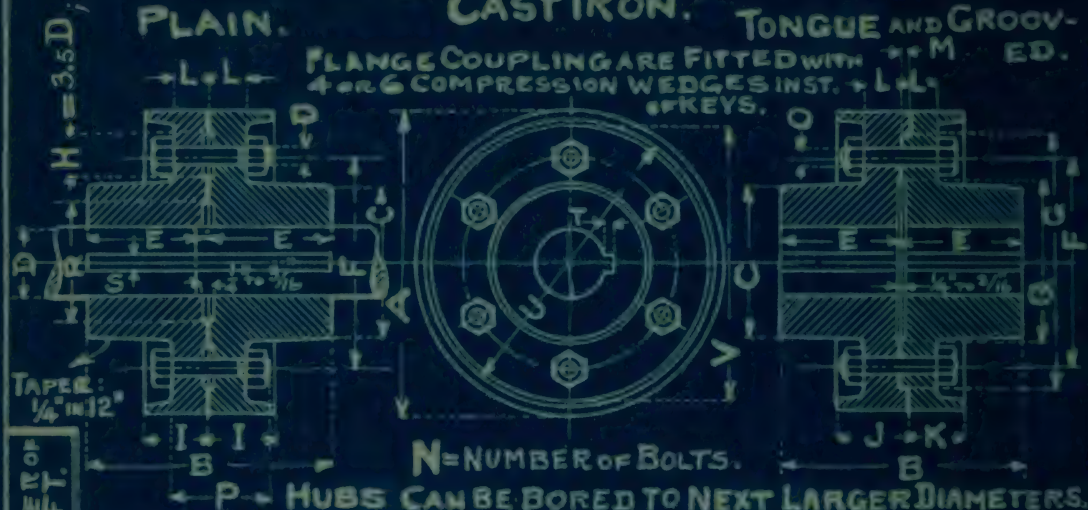


# FLANGE COUPLINGS. CAST IRON.

PLAIN.

TONGUE AND GROOV-  
ED.

FLANGE COUPLING ARE FITTED WITH 4 or 6 COMPRESSION WEDGES INST. 4 KEYS.



N=NUMBER OF BOLTS.

P=HUBS CAN BE BORED TO NEXT LARGER DIAMETERS.

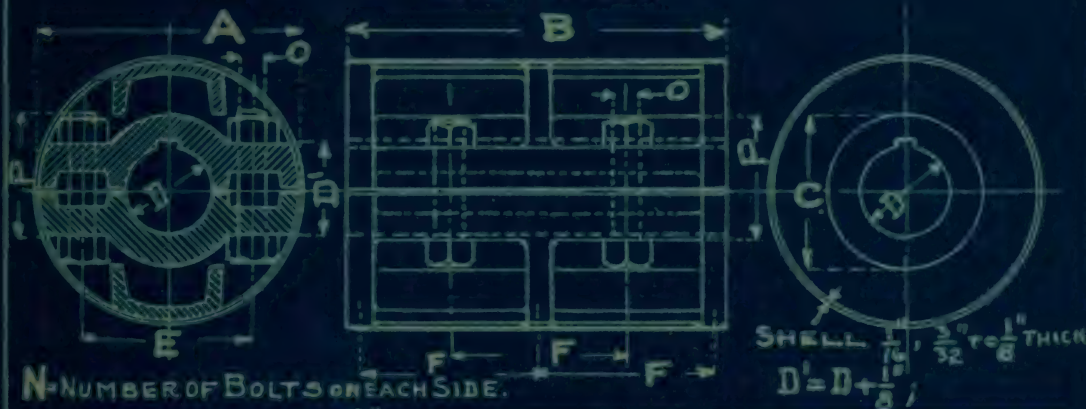
## DIMENSIONS OF FLANGE COUPLINGS

DIAMETER OF D-SHAFT.	A	B	C	E	F	G	I	J	K	L	M	N	O	P
1 5/16	5 9/16	4 3/8	1 7/8	2 3/16	3 1/2	3 3/8	1	1 1/16	1 5/16	1/2	1/16	4	3/8	1 1/2
1 7/16	6 3/4	5 1/4	2 1/2	2 5/8	4 1/4	5 1/4	1 3/8	1 3/16	1 5/16	5/8	1/16	4	1/2	1 3/8
1 9/16	7 1/2	6	3 1/4	3	5 1/2	6	1 5/8	1 3/4	1 1/2	3/8	1/8	4	1/2	2 3/8
1 11/16	8 1/4	7	4	3 1/2	5 3/2	6 1/4	1 3/4	1 7/8	1 5/8	3/8	1/8	4	5/8	2 1/2
1 13/16	9	7 1/4	4 1/4	3 5/8	6 1/4	7	1 7/8	2	1 3/4	1	1/16	4	5/8	2 3/4
2 1/16	9 1/2	7 1/2	4 1/2	3 3/4	6 3/4	7 1/2	2	2 1/8	1 7/8	1 1/16	1/8	4	5/8	2 7/8
2 3/16	10 5/8	8	5 1/4	4	7 1/4	8 1/2	2 1/8	2 1/4	1 7/8	1 1/8	1/8	4	5/8	3
2 5/16	10 3/4	9	5 3/4	4 1/2	7 7/8	8 3/4	2 1/4	2 3/8	2 1/8	1 3/16	1/8	4	5/8	3 1/8
2 7/16	11 5/8	9 1/2	6 1/8	4 3/4	8 1/2	9 5/8	2 1/4	2 3/8	2 1/8	1 1/4	1/8	4	3/4	3 3/8
3 1/16	12	10	6 3/8	5	8 7/8	10	2 1/4	2 3/8	2 1/8	1 1/4	1/8	6	3/4	3 3/8
3 3/16	12 5/8	10 1/4	6 3/4	5 3/8	9 3/8	10 5/8	2 3/8	2 1/2	2 1/4	1 3/8	1/8	6	3/4	3 5/8
3 5/16	13 1/4	11 1/2	7 1/4	5 5/4	10	11 1/4	2 3/8	2 1/2	2 1/4	1 3/8	1/8	6	3/4	3 5/8
3 7/16	14	12	7 3/4	6	10 3/4	12	2 1/2	2 5/8	2 3/8	1 1/2	1/8	6	3/4	3 7/8
4 1/16	14 1/2	12 1/2	8 1/4	6 1/8	10 3/8	12 1/4	2 1/2	2 5/8	2 3/8	1 1/2	3/16	6	7/8	3 7/8
4 3/16	15 1/4	13 1/4	8 3/4	6 3/8	11 1/2	13	2 3/4	2 5/8	2 3/4	1 5/8	3/16	6	7/8	4 1/4
4 5/16	16 1/2	14 1/4	9 1/2	7 1/8	12 1/4	14 1/4	2 3/4	2 5/8	2 3/4	1 5/8	3/16	6	7/8	4 1/4
5 1/16	17 3/4	16	10	8	14	15 1/2	3	3 3/16	2 3/4	1 3/4	3/16	6	1	4 3/8
5 3/16	19	16 1/4	11 1/4	8 5/8	15 1/4	16 3/4	3 1/4	3 3/16	3 1/16	2	3/16	6	1	5 1/8
5 5/16	20 3/8	17	12 1/2	8 1/2	16 1/2	18 1/2	3 3/8	3 3/16	3 3/16	2 1/8	3/16	8	1	5 3/8
5 7/16	21 1/4	18 1/2	13 1/2	9 1/4	17 1/8	19	3 1/2	3 3/16	3 5/16	2 1/8	3/16	8	1 1/8	5 3/8
5 9/16	22 1/4	19	14 1/4	9 1/2	18 1/4	20	3 3/4	3 5/16	3 5/16	2 1/4	3/16	8	1 1/8	5 1/2
5 11/16	22 3/4	20	15 1/4	10	18 3/4	20	3 3/4	3 5/16	3 5/16	2 1/4	3/16	8	1 1/8	5 1/2
6 1/16	23	22	16 1/4	11	18 1/2	21	3 3/8	4 1/4	3 3/16	2 1/4	3/16	8	1 1/4	5 3/8
6 3/16	24	23 1/2	17 1/4	11 3/4	19 1/2	22	3 3/8	4 1/4	3 3/16	2 1/4	3/16	10	1 1/4	5 7/8
6 5/16	25	26	18 1/4	13	20 1/2	23	4 1/4	4 7/16	4 1/16	2 3/8	3/16	10	1 1/4	6 1/8
6 7/16	27	27 1/2	19 1/4	13 3/4	22 1/2	23 1/2	4 1/4	4 1/2	4	2 3/8	1/4	10	1 1/4	6 1/8
6 9/16	29	30	21	15	24 1/4	26 1/2	4 1/4	4 1/2	4	2 3/8	1/4	12	1 1/4	6 1/8
6 11/16	32	34	23	17	27	30	4 1/2	4 3/4	4 1/4	2 3/8	1/4	12	1 1/2	6 3/8
6 13/16	36	38 1/2	25	19 1/4	31	34	4 3/4	5	4 1/2	2 3/8	1/4	12	1 1/2	6 3/8



# COMPRESSION SHAFT COUPLING.


WITH OR WITHOUT SHELL.  
CAST IRON.



IN INCHES.

Q	R	S	T	U	V	SHAFT DIAMETER	A	B	C	E	F	N	O	P
2 7/8	1 3/8	1/4	1/8	5 1/16	4 3/4	15/16	4 1/8	5 1/8	1 7/8	1 7/8	2 3/8	2	1/2	1 5/8
3 1/4	2	1/4	1/8	6 1/4	6	1 1/4	4 5/8	5 7/8	2 1/2	2 3/8	2 3/4	2	1/2	1 7/8
4 1/4	2 3/4	3/8	3/16	7	6 3/4	1 7/16	5 3/8	7 1/8	3 1/4	2 7/8	3 3/8	2	1/2	2 1/8
4 3/4	3 1/2	3/8	3/16	7 3/4	7 1/2	1 11/16	5 7/8	8 1/4	4	3 3/8	3 7/8	2	1/2	2 3/4
5 1/2	3 3/4	1/2	1/4	8 1/2	8 1/4	1 15/16	6	8 5/8	4 1/4	3 7/8	4 1/8	2	1/2	3
6	4	1/2	1/4	9	8 3/4	2 1/16	6	9 5/8	4 1/2	4 3/8	4 5/8	4	1/2	3 1/8
6 1/2	4 1/4	5/8	5/16	9 1/2	9 1/4	2 1/8	7	10 1/4	5 1/8	4 7/8	5 1/8	4	1/2	3 1/2
7	5 1/4	5/8	5/16	10 1/8	9 7/8	2 1/4	7 3/8	11 1/8	5 5/8	5 3/8	5 1/8	4	1/2	3 3/4
7 1/4	5 1/2	3/4	3/8	11	10 3/4	2 5/16	8	12 1/2	6	5 7/8	6 1/8	4	1/2	4 1/8
8	5 7/8	3/4	3/8	11 3/8	11 1/8	3 1/16	8 7/8	13 1/4	6 1/4	6 3/8	6 3/16	4	3/4	4 1/8
8 1/2	6 1/8	7/8	7/16	11 3/8	11 5/8	3 1/8	9	14	6 1/2	6 7/8	6 3/8	4	3/4	4 1/2
9 1/8	6 5/8	7/8	7/16	12 1/2	12 1/4	3 1/4	9 1/2	16	7 1/4	7 3/8	7 3/8	4	3/4	4 3/4
9 1/2	7	1	1/2	13 1/4	13	3 5/16	9 1/2	16	7 1/2	7 7/8	7 3/8	4	3/4	5
9 3/4	7 1/2	1	1/2	13 3/4	13 1/4	4 1/16	11	16 1/2	8 1/4	8 3/8	8 3/16	4	3/4	5 1/8
10 1/8	8 1/4	1 1/8	1/2	14 1/2	14	4 1/8	11 1/8	18	8 3/4	8 7/8	8 3/8	4	3/4	5 3/8
11 1/8	9 1/4	1 1/4	5/8	15 3/4	15 1/4	4 1/4	13 1/4	18	9 1/4	9 3/8	9 3/8	4	3/4	5 3/4
12 1/4	10 1/2	1 1/2	3/4	17	16 1/2	4 3/8	14 3/8	20	10 1/4	10 3/8	10 3/8	4	3/4	6
13 1/4	11 3/4	1 3/4	3/4	18 1/4	17 3/4	5 1/16	14 3/4	22	11 1/4	11 3/8	11 3/8	5	1	6 1/2
15	12 3/4	1 3/4	3/4	19 3/8	19	5 1/8	14 3/4	22	12	12 3/8	12 3/8	5	1	7 1/8
15 5/8	13 1/2	2	3/4	20 1/2	20 1/8									
16 1/8	14 1/4	2	3/4	21 1/4	20 3/8									
16 1/2	15 1/4	2	3/4	21 1/2	20 7/8									
17	15 3/4	2 1/4	3/4	21 3/4	21 1/2									
18	16 1/4	2 1/4	3/4	22 3/4	22 1/2									
19	17 1/4	2 1/2	3/4	23 3/4	23 1/2									
21	18 1/4	2 1/2	3/4	25 3/4	25 1/2									
22 3/4	20	2 3/4	3/4	27 3/4	27 1/4									
25 1/4	22	3	7/8	30 1/2	30									
29 1/2	24	3 1/4	7/8	34 1/2	34									

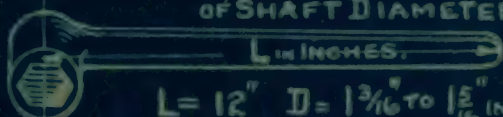
Box WRENCHES FOR COUPLINGS,  
OF SHAFT DIAMETER=D.



L IN INCHES.

L=12" D=1 3/16" TO 1 5/8" INCLUSIVE.  
14 1 7/16 " 2 1/16 "  
16 2 1/16 " 3 1/16 "  
18 3 1/16 " 4 1/16 "  
21 4 1/16 " 6 "

## BOX WRENCHES FOR COUPLINGS, OF SHAFT DIAMETER = D.



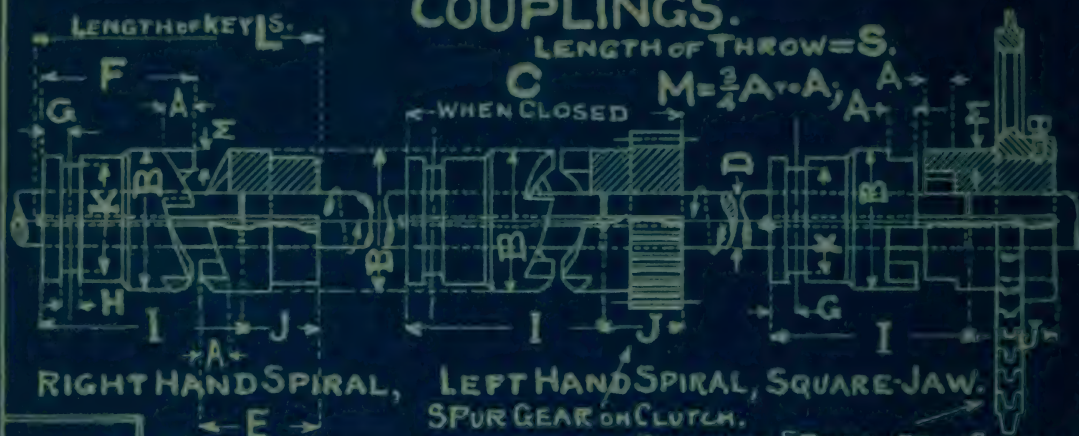
L	D
12	1 3/16 TO 1 5/8 INCLUSIVE.
14	1 7/16 " 2 1/16 "
16	2 15/16 " 3 1/16 "
18	3 5/16 " 4 3/16 "
21	4 15/16 " 6 "







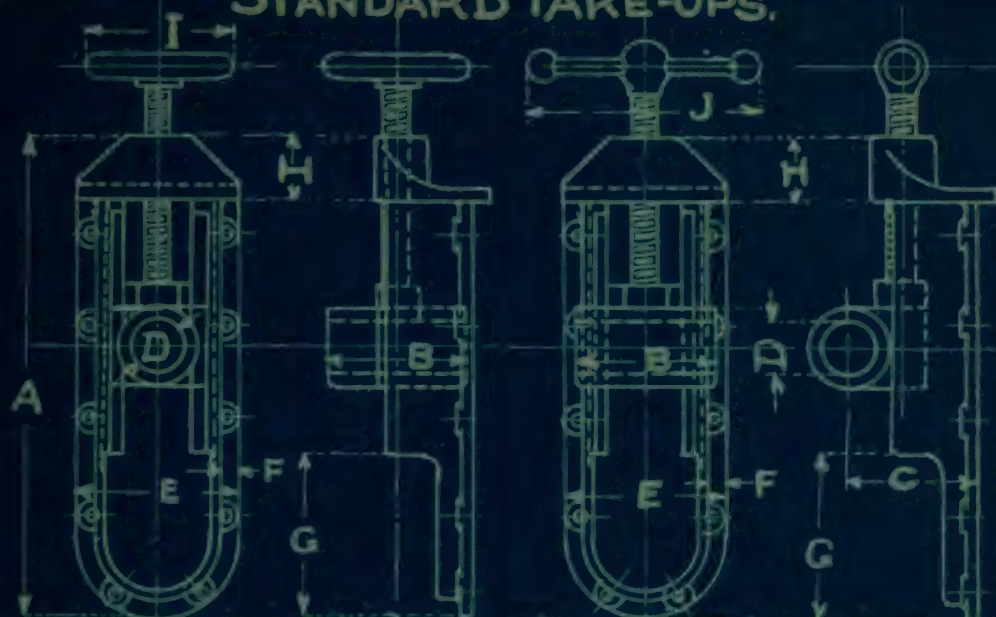
# CAST IRON SPIRAL AND SQUARE JAW CLUTCH- COUPLINGS.



N = NUMBER OF TEETH IN CLUTCH. K IS MINIMUM.

DIAMETER OF SHAFT INCHES.	A	B	C	E	F	G	H	I	J	K	L	S	N
5/16 to 1/8	7/8	3 3/8	5 3/8	3	3 1/4	9/16	1/2	5	1 3/4	1 5/8	6 3/4	1 1/8	4
1 3/16 to 1/4	1	4	6 1/4	3 3/8	3 3/8	5/8	19/32	5 1/2	2 1/4	2	7 3/4	1 1/4	4
1 1/16 to 1 1/2	1 1/8	4 1/2	7	3 7/8	3 1/8	5/8	19/32	6 1/8	2 1/2	2 3/8	8 5/8	1 3/8	4
1 1/4 to 1 3/4	1 1/4	5 1/4	7 1/2	4 1/4	3 1/4	3/4	11/16	6 5/8	2 5/8	2 5/8	9 1/4	1 1/2	6
1 1/2 to 2	1 3/8	5 3/8	8 1/4	4 1/2	3 3/4	3/4	11/16	7 1/4	2 7/8	3 1/4	10 1/8	1 5/8	6
2 3/16 to 2 1/4	1 1/2	6 1/2	8 5/8	4 3/4	3 7/8	7/8	3/4	7 5/8	3	3 3/4	10 5/8	1 3/4	6
2 1/2 to 2 3/4	1 1/2	7	9 3/4	5 1/8	4 5/8	7/8	3/4	8 3/8	3 3/8	4 1/4	11 3/4	1 3/4	6
2 3/4 to 3	1 5/8	7 5/8	9 3/4	5 3/8	4 3/8	1	7/8	8 3/8	3 1/2	4 3/4	11 3/8	1 7/8	8
3 to 3 1/4	1 3/4	8	10 1/2	5 3/4	4 3/4	1	7/8	9	3 3/4	5 1/4	12 3/4	2	8
3 1/4 to 3 1/2	1 7/8	8 5/8	11 1/2	6	5 1/2	1 1/16	15/16	10	3 7/8	5 5/8	13 3/8	2 1/8	8
3 1/2 to 3 3/4	2	9 1/4	12 1/4	6 3/8	6 3/8	1 1/8	1	11 1/8	4 1/8	6 1/8	15 1/4	2 1/4	8
3 3/4 to 4	2	9 3/8	13 1/8	6 5/8	7 1/4	1 1/8	1 1/8	12 1/8	4 3/8	6 1/2	16 1/8	2 1/2	8
4 to 4 1/4	2 1/8	10 1/2	14 3/4	6 7/8	7 3/8	1 1/4	1 3/16	12 3/8	4 1/2	6 3/8	17 3/8	2 3/8	8
4 1/4 to 4 1/2	2 1/8	11 1/8	16	7 1/8	8 7/8	1 1/4	1 3/16	13 3/8	4 3/4	7 1/4	18 3/8	2 5/8	8
4 1/2 to 5	2 1/4	11 3/4	17 3/8	7 3/8	10	1 3/8	1 1/4	15 3/8	4 7/8	7 1/2	20 3/8	2 1/2	8
5 to 5 1/2	2 1/2	13	18 3/4	8 1/2	10 1/4	1 3/8	1 1/4	14 3/8	5 1/4	8	21 3/4	2 3/4	8
5 1/2 to 6	2 5/8	14 3/4	20 1/4	9 1/8	11	1 3/8	1 1/4	13 5/8	6 5/8	8 1/2	23 1/4	2 3/8	10
6 to 6 1/2	3	16 1/8	21 1/4	10 1/4	11	1 7/16	1 5/16	17 3/4	7	9	24 3/4	3 1/4	10
6 1/2 to 7	3 1/4	17 1/4	21 3/8	11	10 3/8	1 7/16	1 5/16	18 1/8	7 1/2	9 1/2	25 3/8	3 1/2	10
7 to 7 1/2	3 1/2	18 3/4	22 1/2	12	10 1/2	1 9/16	1 7/16	18 1/4	8 1/4	10	26 1/2	3 3/4	10
7 1/2 to 8	3 3/4	20	22 3/8	13	9 3/8	1 11/16	1 9/16	18 1/8	9	10 1/2	27 3/8	4	12
8 to 8 1/2	4	22	23 1/2	14	9 1/2	1 3/4	1 5/8	18 1/4	9 3/4	11	28	4 1/4	12
8 1/2 to 9	4 1/4	24	24 3/4	15	9 3/4	1 3/4	1 5/8	19	10 1/2	11 1/2	29 3/4	4 1/2	16
9 to 9 1/2	4 1/2	26	26 1/2	16	10 1/2	1 7/8	1 3/4	20 1/4	11 1/4	12	31 1/2	4 3/4	16
9 1/2 to 10	4 3/4	26	28 3/4	17	11 3/4	1 7/8	1 3/4	22	12	12 1/2	34	5	16
10 to 11	5	28	29 3/4	18	11 3/4	2 1/4	2	22 1/2	12 3/4	13	35 1/4	5 1/4	20
	5 1/2	30	30 1/2	20	10 1/2	2 1/2	2 1/4	22 1/4	14 1/4	14	36 1/2	5 3/4	20

# 114 STANDARD TAKE-UPS.



D	B	C	A	E	F	G	H	I	J
1 1/16 to 3/4	2	1 27/32	11 3/8	4 1/4	7/8	3 7/16	1 13/16	3 3/4	.
1 3/16 - 1 1/8	2	1 27/32	11 3/8	4 1/4	7/8	3 7/16	1 13/16	3 3/4	.
1 5/16 - 1 1/8	2	1 27/32	11 3/8	4 1/4	7/8	3 7/16	1 13/16	3 3/4	.
1 3/16 - 1 1/4	2 5/16	2 5/8	13 5/8	4 7/8	2 7/32	3 5/16	1 3/4	3 3/4	.
1 5/16 - 1 3/8	2 5/16	2 5/8	13 5/8	4 7/8	2 7/32	3 5/16	1 3/4	3 3/4	.
1 7/16 - 1 1/2	4 5/8	3 29/32	17 1/2	5 7/8	2 5/32	4 1/2	2 1/4	4 7/8	.
1 9/16 - 1 5/8	4 5/8	4 1/32	17 1/2	5 7/8	2 5/32	4 1/4	2 1/4	4 7/8	.
1 11/16 - 1 3/2	4 5/8	4 1/32	17 1/2	5 7/8	2 5/32	4 1/4	2 1/4	4 7/8	.
1 13/16 - 2 1/8	5 1/8	4 3/4	21 5/8	6 7/8	2 9/32	5 1/2	2 3/8	5 7/8	.
2 3/16	5 1/8	4 7/8	21 5/8	6 7/8	2 9/32	5 1/4	2 3/8	5 7/8	.
2 3/16 to 2 1/4	5 1/8	4 7/8	25 3/4	7 1/4	1 5/16	5 3/4	2 3/4	5 7/8	12
2 5/16 - 2 3/8	5 1/2	5	25 3/4	7 1/4	1 5/16	5 3/4	2 3/4	5 7/8	12
2 7/16	5 1/2	5	25 3/4	7 1/4	1 5/16	5 3/4	2 3/4	5 7/8	12
2 9/16 to 2 1/2	9	5 5/16	37 7/8	9 3/4	1 1/4	9 1/2	4	.	12
2 7/16 - 2 1/2	9	5 3/8	37 7/8	9 3/4	1 1/4	9 1/2	4	.	12
2 7/16 - 2 1/2	5 1/2	5 5/32	34 3/4	9	1 3/8	6 1/2	3	.	12
2 9/16 - 2 5/8	6 1/8	5 5/32	34 3/4	9	1 3/8	6 1/2	3	.	12
2 11/16 - 2 3/4	6 1/8	5 5/32	34 3/4	9	1 3/8	6 1/2	3	.	12
2 13/16 - 2 3/4	6 1/8	5 5/32	34 3/4	9	1 3/8	6 1/2	3	.	12
2 15/16 - 3 1/8	6 5/8	5 29/32	42 1/2	11	1 3/4	8 1/2	3 3/4	.	15 1/4
3 1/16 - 3 3/8	7 1/4	6 7/32	42 1/2	11	1 3/4	8 1/2	3 3/4	.	15 1/4
3 15/16	8	6 15/32	46 7/8	11	1 3/4	8 1/2	3 3/4	.	15 1/4
2 7/16	9	5 5/16	42 3/2	9	1 1/4	9 1/2	4	.	15 1/4
2 15/16	9	5 3/8	46 7/8	9	1 1/4	9 1/2	4	.	15 1/4
2 15/16	6 5/8	5 29/32	54 1/2	11	1 3/4	8 1/2	3 3/4	.	15 1/4
3 7/16	7 1/4	6 7/32	54 1/2	11	1 3/4	8 1/2	3 3/4	.	15 1/4
3 15/16	8	6 15/32	54 1/2	11	1 3/4	8 1/2	3 3/4	.	15 1/4











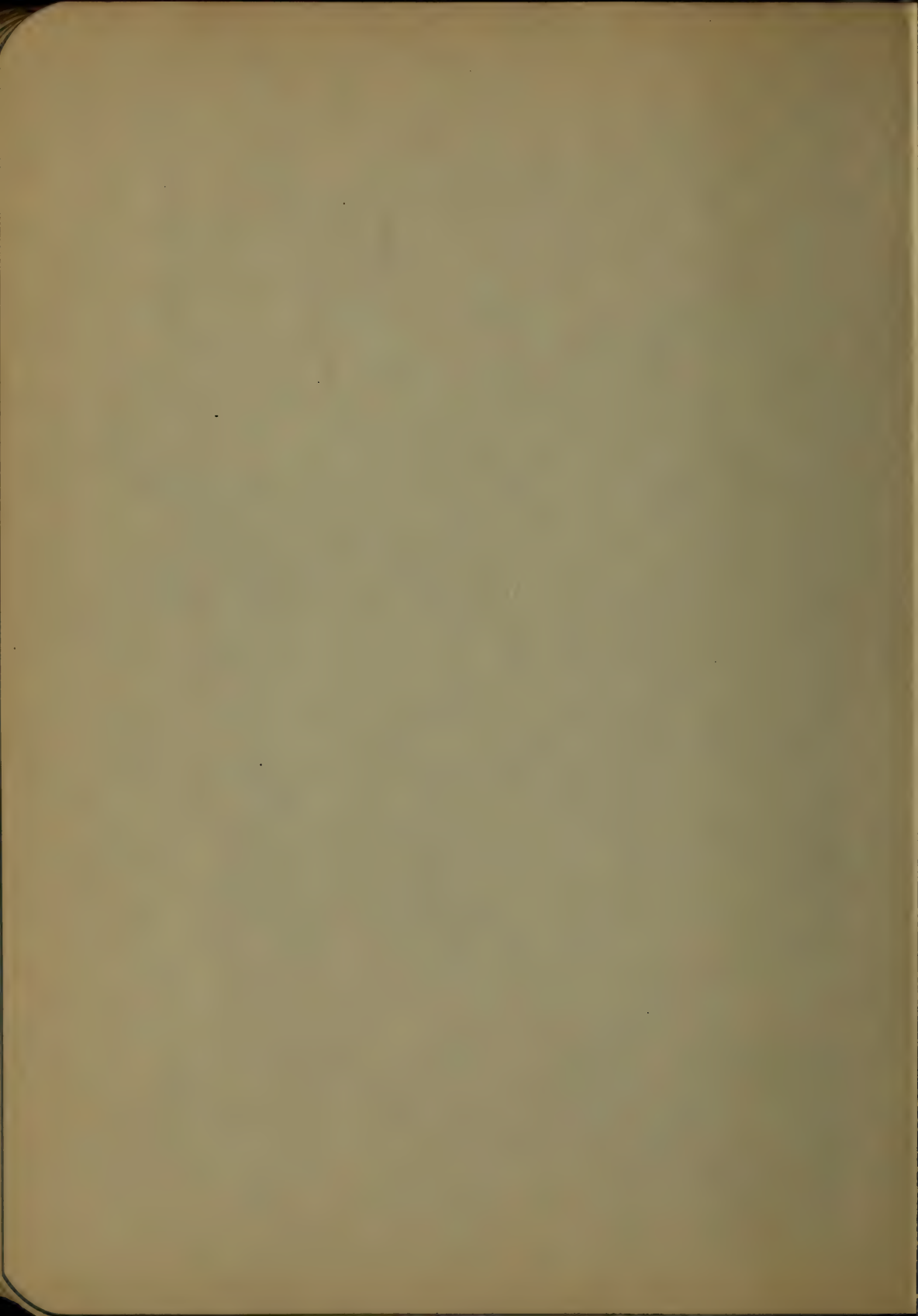






## DIAMETER OF SHAFTS IN INCHES.

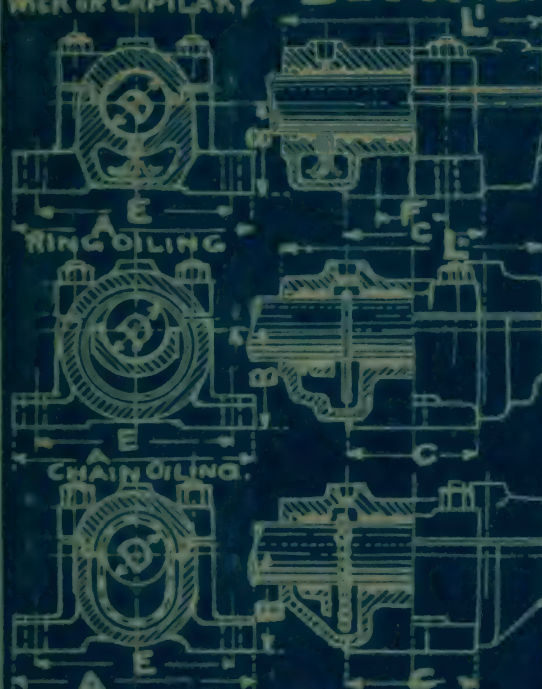
	1 5/16	1 1/2	1 3/8	1 1/4	1 1/8	1 1/2	2 1/8	2 1/4	2 1/2	2 3/8	2 1/2	2 3/4	3 1/8	3 1/4	3 1/2	3 3/8	3 1/2	3 3/4	4 1/8	4 1/4	4 1/2	4 3/8	4 1/2	4 3/4	5 1/8	5 1/4	5 1/2	5 3/8	5 1/2	6 1/8	6 1/4	6 1/2	6 3/8	6 1/2	6 3/4	7 1/8	7 1/4	7 1/2	7 3/8	7 1/2	7 3/4	8 1/8	8 1/4	8 1/2	8 3/8	8 1/2	8 3/4	9 1/8	9 1/4	9 1/2	9 3/8	9 1/2	9 3/4	10 1/8	10 1/4	10 1/2	10 3/8	10 1/2	10 3/4	11 1/8	11 1/4	11 1/2	11 3/8	11 1/2	11 3/4	12 1/8	12 1/4	12 1/2	12 3/8	12 1/2	12 3/4	13 1/8	13 1/4	13 1/2	13 3/8	13 1/2	13 3/4	14 1/8	14 1/4	14 1/2	14 3/8	14 1/2	14 3/4	15 1/8	15 1/4	15 1/2	15 3/8	15 1/2	15 3/4	16 1/8	16 1/4	16 1/2	16 3/8	16 1/2	16 3/4	17 1/8	17 1/4	17 1/2	17 3/8	17 1/2	17 3/4	18 1/8	18 1/4	18 1/2	18 3/8	18 1/2	18 3/4	19 1/8	19 1/4	19 1/2	19 3/8	19 1/2	19 3/4	20 1/8	20 1/4	20 1/2	20 3/8	20 1/2	20 3/4	21 1/8	21 1/4	21 1/2	21 3/8	21 1/2	21 3/4	22 1/8	22 1/4	22 1/2	22 3/8	22 1/2	22 3/4	23 1/8	23 1/4	23 1/2	23 3/8	23 1/2	23 3/4	24 1/8	24 1/4	24 1/2	24 3/8	24 1/2	24 3/4	25 1/8	25 1/4	25 1/2	25 3/8	25 1/2	25 3/4	26 1/8	26 1/4	26 1/2	26 3/8	26 1/2	26 3/4	27 1/8	27 1/4	27 1/2	27 3/8	27 1/2	27 3/4	28 1/8	28 1/4	28 1/2	28 3/8	28 1/2	28 3/4	29 1/8	29 1/4	29 1/2	29 3/8	29 1/2	29 3/4	30 1/8	30 1/4	30 1/2	30 3/8	30 1/2	30 3/4	31 1/8	31 1/4	31 1/2	31 3/8	31 1/2	31 3/4	32 1/8	32 1/4	32 1/2	32 3/8	32 1/2	32 3/4	33 1/8	33 1/4	33 1/2	33 3/8	33 1/2	33 3/4	34 1/8	34 1/4	34 1/2	34 3/8	34 1/2	34 3/4	35 1/8	35 1/4	35 1/2	35 3/8	35 1/2	35 3/4	36 1/8	36 1/4	36 1/2	36 3/8	36 1/2	36 3/4	37 1/8	37 1/4	37 1/2	37 3/8	37 1/2	37 3/4	38 1/8	38 1/4	38 1/2	38 3/8	38 1/2	38 3/4	39 1/8	39 1/4	39 1/2	39 3/8	39 1/2	39 3/4	40 1/8	40 1/4	40 1/2	40 3/8	40 1/2	40 3/4	41 1/8	41 1/4	41 1/2	41 3/8	41 1/2	41 3/4	42 1/8	42 1/4	42 1/2	42 3/8	42 1/2	42 3/4	43 1/8	43 1/4	43 1/2	43 3/8	43 1/2	43 3/4	44 1/8	44 1/4	44 1/2	44 3/8	44 1/2	44 3/4	45 1/8	45 1/4	45 1/2	45 3/8	45 1/2	45 3/4	46 1/8	46 1/4	46 1/2	46 3/8	46 1/2	46 3/4	47 1/8	47 1/4	47 1/2	47 3/8	47 1/2	47 3/4	48 1/8	48 1/4	48 1/2	48 3/8	48 1/2	48 3/4	49 1/8	49 1/4	49 1/2	49 3/8	49 1/2	49 3/4	50 1/8	50 1/4	50 1/2	50 3/8	50 1/2	50 3/4	51 1/8	51 1/4	51 1/2	51 3/8	51 1/2	51 3/4	52 1/8	52 1/4	52 1/2	52 3/8	52 1/2	52 3/4	53 1/8	53 1/4	53 1/2	53 3/8	53 1/2	53 3/4	54 1/8	54 1/4	54 1/2	54 3/8	54 1/2	54 3/4	55 1/8	55 1/4	55 1/2	55 3/8	55 1/2	55 3/4	56 1/8	56 1/4	56 1/2	56 3/8	56 1/2	56 3/4	57 1/8	57 1/4	57 1/2	57 3/8	57 1/2	57 3/4	58 1/8	58 1/4	58 1/2	58 3/8	58 1/2	58 3/4	59 1/8	59 1/4	59 1/2	59 3/8	59 1/2	59 3/4	60 1/8	60 1/4	60 1/2	60 3/8	60 1/2	60 3/4	61 1/8	61 1/4	61 1/2	61 3/8	61 1/2	61 3/4	62 1/8	62 1/4	62 1/2	62 3/8	62 1/2	62 3/4	63 1/8	63 1/4	63 1/2	63 3/8	63 1/2	63 3/4	64 1/8	64 1/4	64 1/2	64 3/8	64 1/2	64 3/4	65 1/8	65 1/4	65 1/2	65 3/8	65 1/2	65 3/4	66 1/8	66 1/4	66 1/2	66 3/8	66 1/2	66 3/4	67 1/8	67 1/4	67 1/2	67 3/8	67 1/2	67 3/4	68 1/8	68 1/4	68 1/2	68 3/8	68 1/2	68 3/4	69 1/8	69 1/4	69 1/2	69 3/8	69 1/2	69 3/4	70 1/8	70 1/4	70 1/2	70 3/8	70 1/2	70 3/4	71 1/8	71 1/4	71 1/2	71 3/8	71 1/2	71 3/4	72 1/8	72 1/4	72 1/2	72 3/8	72 1/2	72 3/4	73 1/8	73 1/4	73 1/2	73 3/8	73 1/2	73 3/4	74 1/8	74 1/4	74 1/2	74 3/8	74 1/2	74 3/4	75 1/8	75 1/4	75 1/2	75 3/8	75 1/2	75 3/4	76 1/8	76 1/4	76 1/2	76 3/8	76 1/2	76 3/4	77 1/8	77 1/4	77 1/2	77 3/8	77 1/2	77 3/4	78 1/8	78 1/4	78 1/2	78 3/8	78 1/2	78 3/4	79 1/8	79 1/4	79 1/2	79 3/8	79 1/2	79 3/4	80 1/8	80 1/4	80 1/2	80 3/8	80 1/2	80 3/4	81 1/8	81 1/4	81 1/2	81 3/8	81 1/2	81 3/4	82 1/8	82 1/4	82 1/2	82 3/8	82 1/2	82 3/4	83 1/8	83 1/4	83 1/2	83 3/8	83 1/2	83 3/4	84 1/8	84 1/4	84 1/2	84 3/8	84 1/2	84 3/4	85 1/8	85 1/4	85 1/2	85 3/8	85 1/2	85 3/4	86 1/8	86 1/4	86 1/2	86 3/8	86 1/2	86 3/4	87 1/8	87 1/4	87 1/2	87 3/8	87 1/2	87 3/4	88 1/8	88 1/4	88 1/2	88 3/8	88 1/2	88 3/4	89 1/8	89 1/4	89 1/2	89 3/8	89 1/2	89 3/4	90 1/8	90 1/4	90 1/2	90 3/8	90 1/2	90 3/4	91 1/8	91 1/4	91 1/2	91 3/8	91 1/2	91 3/4	92 1/8	92 1/4	92 1/2	92 3/8	92 1/2	92 3/4	93 1/8	93 1/4	93 1/2	93 3/8	93 1/2	93 3/4	94 1/8	94 1/4	94 1/2	94 3/8	94 1/2	94 3/4	95 1/8	95 1/4	95 1/2	95 3/8	95 1/2	95 3/4	96 1/8	96 1/4	96 1/2	96 3/8	96 1/2	96 3/4	97 1/8	97 1/4	97 1/2	97 3/8	97 1/2	97 3/4	98 1/8	98 1/4	98 1/2	98 3/8	98 1/2	98 3/4	99 1/8	99 1/4	99 1/2	99 3/8	99 1/2	99 3/4	100 1/8	100 1/4	100 1/2	100 3/8	100 1/2	100 3/4	101 1/8	101 1/4	101 1/2	101 3/8	101 1/2	101 3/4	102 1/8	102 1/4	102 1/2	102 3/8	102 1/2	102 3/4	103 1/8	103 1/4	103 1/2	103 3/8	103 1/2	103 3/4	104 1/8	104 1/4	104 1/2	104 3/8	104 1/2	104 3/4	105 1/8	105 1/4	105 1/2	105 3/8	105 1/2	105 3/4	106 1/8	106 1/4	106 1/2	106 3/8	106 1/2	106 3/4	107 1/8	107 1/4	107 1/2	107 3/8	107 1/2	107 3/4	108 1/8	108 1/4	108 1/2	108 3/8	108 1/2	108 3/4	109 1/8	109 1/4	109 1/2	109 3/8	109 1/2	109 3/4	110 1/8	110 1/4	110 1/2	110 3/8	110 1/2	110 3/4	111 1/8	111 1/4	111 1/2	111 3/8	111 1/2	111 3/4	112 1/8	112 1/4	112 1/2	112 3/8	112 1/2	112 3/4	113 1/8	113 1/4	113 1/2	113 3/8	113 1/2	113 3/4	114 1/8	114 1/4	114 1/2	114 3/8	114 1/2	114 3/4	115 1/8	115 1/4	115 1/2	115 3/8	115 1/2	115 3/4	116 1/8	116 1/4	116 1/2	116 3/8	116 1/2	116 3/4	117 1/8	117 1/4	117 1/2	117 3/8	117 1/2	117 3/4	118 1/8	118 1/4	118 1/2	118 3/8	118 1/2	118 3/4	119 1/8	119 1/4	119 1/2	119 3/8	119 1/2	119 3/4	120 1/8	120 1/4	120 1/2	120 3/8	120 1/2	120 3/4	121 1/8	121 1/4	121 1/2	121 3/8	121 1/2	121 3/4	122 1/8	122 1/4	122 1/2	122 3/8	122 1/2	122 3/4	123 1/8	123 1/4	123 1/2	123 3/8	123 1/2	123 3/4	124 1/8	124 1/4	124 1/2	124 3/8	124 1/2	124 3/4	125 1/8	125 1/4	125 1/2	125 3/8	125 1/2	125 3/4	126 1/8	126 1/4	126 1/2	126 3/8	126 1/2	126 3/4	127 1/8	127 1/4	127 1/2	127 3/8	127 1/2	127 3/4	128 1/8	128 1/4	128 1/2	128 3/8	128 1/2	128 3/4	129 1/8	129 1/4	129 1/2	129 3/8	129 1/2	129 3/4	130 1/8	130 1/4	130 1/2	130 3/8	130 1/2	130 3/4	131 1/8	131 1/4	131 1/2	131 3/8	131 1/2	131 3/4	132 1/8	132 1/4	132 1/2	132 3/8	132 1/2	132 3/4	133 1/8	133 1/4	133 1/2	133 3/8	133 1/2	133 3/4	134 1/8	134 1/4	134 1/2	134 3/8	134 1/2	134 3/4	135 1/8	135 1/4	135 1/2	135 3/8	135 1/2	135 3/4	136 1/8	136 1/4	136 1/2	136 3/8	136 1/2	136 3/4	137 1/8	137 1/4	137 1/2	137 3/8	137 1/2	137 3/4	138 1/8	138 1/4	138 1/2	138 3/8	138 1/2	138 3/4	139 1/8	139 1/4	139 1/2	139 3/8	139 1/2	139 3/4	140 1/8	140 1/4	140 1/2	140 3/8	140 1/2	140 3/4	141 1/8	141 1/4	141 1/2	141 3/8	141 1/2	141 3/4	142 1/8	142 1/4	142 1/2	142 3/8	142 1/2	142 3/4	143 1/8	143 1/4	143 1/2	143 3/8	143 1/2	143 3/4	144 1/8	144 1/4	144 1/2	144 3/8	144 1/2	144 3/4	145 1/8	145 1/4	145 1/2	145 3/8	145 1/2	145 3/4	146 1/8	146 1/4	146 1/2	146 3/8	146 1/2	146 3/4	147 1/8	147 1/4	147 1/2	147 3/8	147 1/2	147 3/4	148 1/8	148 1/4	148 1/2	148 3/8	148 1/2	148 3/4	149 1/8	149 1/4	149 1/2	149 3/8	149 1/2	149 3/4	150 1/8	150 1/4	150 1/2	150 3/8	150 1/2	150 3/4	151 1/8	151 1/4	151 1/2	151 3/8	151 1/2	151 3/4	152 1/8	152 1/4	152 1/2	152 3/8	152 1/2	152 3/4	153 1/8	153 1/4	153 1/2	153 3/8	153 1/2	153 3/4	154 1/8	154 1/4	154 1/2	154 3/8	154 1/2	154 3/4	155 1/8	155 1/4	155 1/2	155 3/8	155 1/2	155 3/4	156 1/8	156 1/4	156 1/2	156 3/8	156 1/2	156 3/4	157 1/8	157 1/4	157 1/2	157 3/8	157 1/2	157 3/4	158 1/8	158 1/4	158 1/2	158 3/8	158 1/2	158 3/4	159 1/8	159 1/4	159 1/2	159 3/8	159 1/2	159 3/4	160 1/8	160 1/4	160 1/2	160 3/8	160 1/2	160 3/4	161 1/8	161 1/4	161 1/2	161 3/8	161 1/2	161 3/4	162 1/8	162 1/4	162 1/2	162 3/8	162 1/2	162 3/4	163 1/8	163 1/4	163 1/2	163 3/8	163 1/2	163 3/4	164 1/8	164 1/4	164 1/2	164 3/8	164 1/2	164 3/4	165 1/8	165 1/4	165 1/2	165 3/8	165 1/2	165 3/4	166 1/8	166 1/4	166 1/2	166 3/8	166 1/2	166 3/4	167 1/8	167 1/4	167 1/2	167 3/8	167 1/2	167 3/4	168 1/8	168 1/4	168 1/2	168 3/8	168 1/2	168 3/4	169 1/8	169 1/4	169 1/2	169 3/8	169 1/2	169 3/4	170 1/8	170 1/4	170 1/2	170 3/8	170 1/2	170 3/4	171 1/8	171 1/4	171 1/2	171 3/8	171 1/2	171 3/4	172 1/8	172 1/4	172 1/2	172 3/8	172 1/2	172 3/4	173 1/8	173 1/4	173 1/2	173 3/8	173 1/2	173 3/4	174 1/8	174 1/4	174 1/2	174 3/8	174 1/2	174 3/4	175 1/8	175 1/4	175 1/2	175 3/8	175 1/2	175 3/4	176 1/8	176 1/4	176 1/2	176 3/8	176 1/2	176 3/4	177 1/8	177 1/4	177 1/2	177 3/8	177 1/2	177 3/4	178 1/8	178 1/4	178 1/2	178 3/8	178 1/2	178 3/4	179 1/8	179 1/4	179 1/2	179 3/8	179 1/2	179 3/4	180 1/8	180 1/4	180 1/2	180 3/
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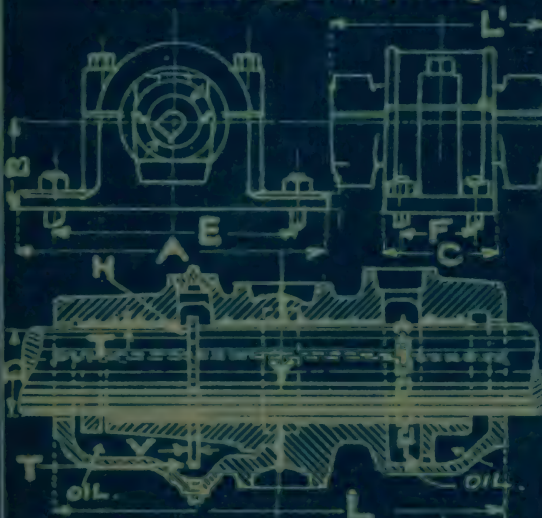
# HEAVY RIGID AND BALL & SOCKET PILLOW I RIGID-P.B. BLOCKS AND BEARINGS.

WICK OR CAPILARY



D	L	L'	L''	A	B	E	C	F	No. of Bolts	Size of Bolts
1 3/16	5	5 3/4	5 3/4	8 1/2	2 1/2	6 1/2	2 1/2	•	2	1/2
1 7/16	6	7 1/4	6 3/4	9 1/4	3	7 3/4	3	•	2	1/2
1 11/16	7	8 1/4	7 3/4	10 1/4	3 1/2	8 3/4	3 1/2	•	2	3/8
1 15/16	8 1/4	9 1/4	8 3/4	10 3/4	3 3/4	9 3/4	4 1/4	•	2	3/8
2 1/16	9	10 1/4	9 1/2	11 3/4	3 3/4	10 3/4	4 1/4	•	2	3/8
2 1/8	9 1/2	11 1/4	10 1/2	12 1/2	4	11 3/4	4 1/2	•	2	3/8
2 1/4	10 1/2	12 1/4	11 1/4	14	4 1/2	13 1/4	5 1/4	•	2	3/8
2 3/8	11 1/2	13 1/4	12 1/4	14 1/2	4 1/2	14 1/4	5 1/2	•	2	3/8
3 1/16	12 1/4	14 1/4	13 1/4	15 1/2	5 1/2	15 1/4	5 3/4	•	2	3/8
3 1/8	13 1/4	15 1/4	14 1/4	16 1/2	5 1/2	16 1/4	5 3/4	•	2	3/8
3 1/4	14 1/4	16 1/4	15 1/4	17 1/2	5 3/4	17 1/4	6	•	2	3/8
3 3/8	15	17	16	18 1/2	5 3/4	18 1/4	6 1/4	•	2	3/8
4 1/16	17	19 1/4	18 1/4	20 1/2	6 1/4	20 1/4	6 1/2	4	4	3/8
4 1/8	18 1/2	21 1/4	19 1/4	21 1/2	6 1/2	21 1/4	6 3/4	4 1/4	4	3/8
4 3/8	19	22 1/4	20 1/4	22 1/2	6 3/4	22 1/4	7 1/4	4 1/2	4	3/8
5 1/16	20 1/2	23 1/4	21 1/4	23 1/2	7 1/4	23 1/4	7 3/4	4 3/4	4	1 1/8
5 1/8	21 1/2	24 1/4	22 1/4	24 1/2	7 3/4	24 1/4	8 1/4	5	4	1 1/8
6 1/16	22 1/4	25 1/4	23 1/4	25 1/2	7 3/4	25 1/4	8 3/4	5 1/2	4	1 1/8
6 1/8	23 1/4	26 1/4	24 1/4	26 1/2	8	26 1/4	9 1/4	6	4	1 1/8
7 1/16	24 1/4	27 1/4	25 1/4	27 1/2	9	27 1/4	10 1/4	6 1/2	4	1 1/8
7 1/8	25 1/4	28 1/4	26 1/4	28 1/2	10	28 1/4	11 1/4	7	4	1 1/8
8 1/16	26 1/4	29 1/4	27 1/4	29 1/2	11	29 1/4	12 1/4	7 1/2	4	1 1/8
8 1/8	27 1/4	30 1/4	28 1/4	30 1/2	12	30 1/4	13 1/4	8	4	1 1/8
9 1/16	28 1/4	31 1/4	29 1/4	31 1/2	13	31 1/4	14 1/4	8 1/2	4	1 1/8
9 1/8	29 1/4	32 1/4	30 1/4	32 1/2	14	32 1/4	15 1/4	9	4	1 1/8
10 1/16	30 1/4	33 1/4	31 1/4	33 1/2	15	33 1/4	16 1/4	9 1/2	4	1 1/8
10 1/8	31 1/4	34 1/4	32 1/4	34 1/2	16	34 1/4	17 1/4	10	4	1 1/8
11 1/16	32 1/4	35 1/4	33 1/4	35 1/2	17	35 1/4	18 1/4	10 1/2	4	1 1/8
11 1/8	33 1/4	36 1/4	34 1/4	36 1/2	18	36 1/4	19 1/4	11	4	1 1/8
12 1/16	34 1/4	37 1/4	35 1/4	37 1/2	19	37 1/4	20 1/4	11 1/2	4	1 1/8
12 1/8	35 1/4	38 1/4	36 1/4	38 1/2	20	38 1/4	21 1/4	12	4	1 1/8

## II. BALL & SOCKET P.B. AND HANGER BEARINGS.



## RING AND CHAIN OILING Y L' BEARINGS L''.

CONCEALED COLLAR FOR HEAVY  
LINE SHAFTING. ONE END CLOSED  
FOR COUNTER SHAFTS.

SEE PAGE 115 FOR BRASS CHAINS

### RING SECTIONS.

T	1/8	3/32	3/16	7/32	1/4	5/32
D	3/8	1/2	5/8	3/4	7/8	1
H	1 1/16	1 1/8	1 3/8	1 5/8	2 1/8	2 3/8

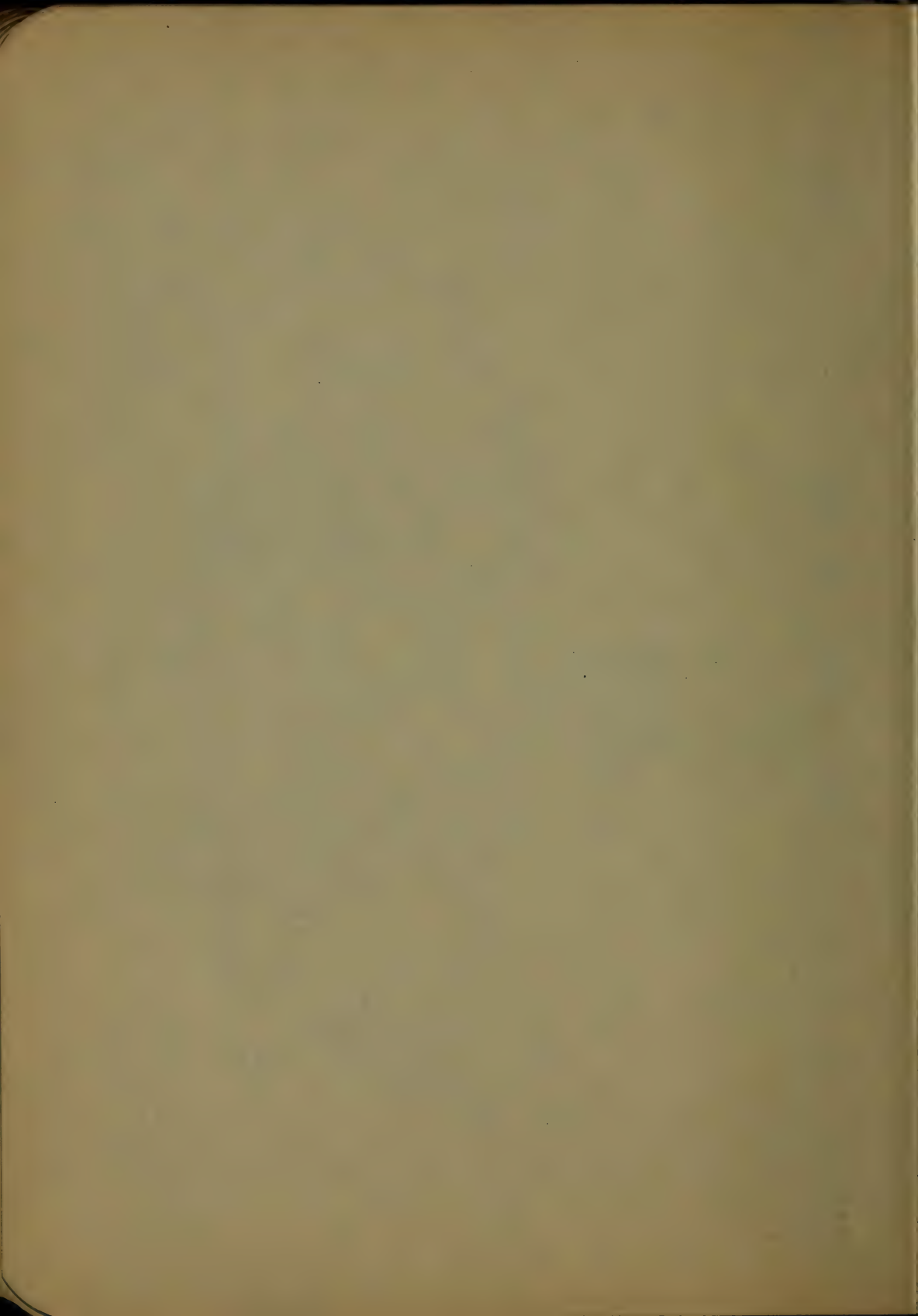
MADE OF TEMPERED STEEL OR  
BRONZE  
PERFORATIONS 1/8" DRILL 1" APP.

### BRASS CHAINS.

P	3/16	3/32	3/8	1/2	5/8	3/4	7/8
W	1/4	11/32	7/16	5/8	3/4	1	1 1/8
X	1/8	3/16	3/8	1/2	5/8	3/4	7/8
D	1 1/16	1 1/8	1 3/8	1 5/8	2 1/8	2 3/8	2 5/8

### BABBITTING.

T	1/8	3/16	1/4	5/16	3/8	1/2
D	1 1/16	1 1/8	1 3/8	1 5/8	2 1/8	2 3/8



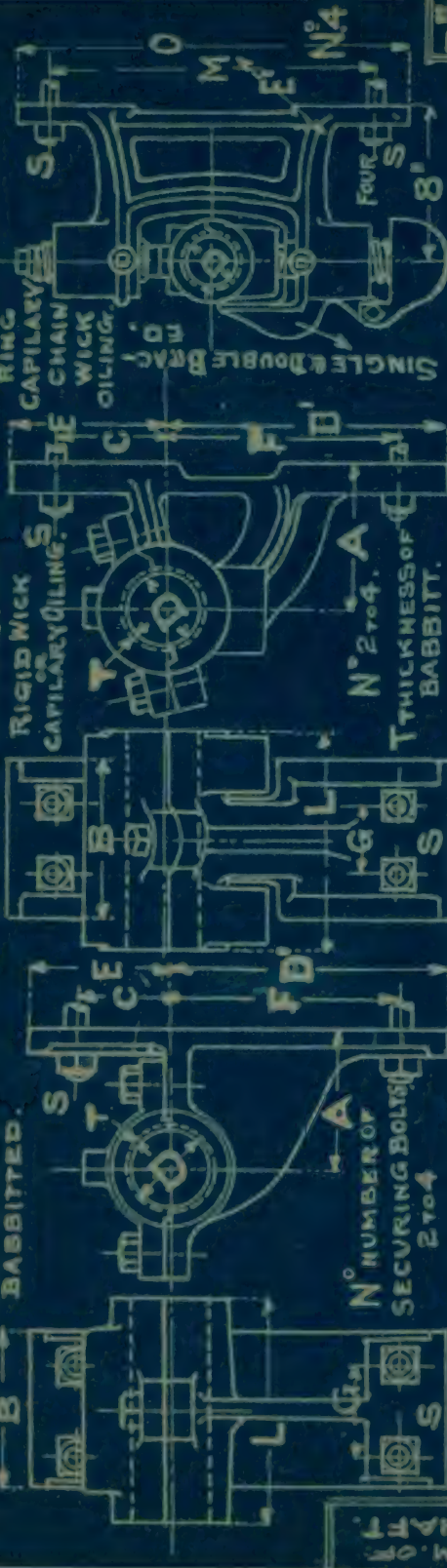




## POST HANGERS.

**RIGID SELF OILING**

RIGID WICK  
CAPILLARY QILING.



DIAM. OF SHAFT.

N° NUMBER OF  
SECURING BOLTS  
2 to 4

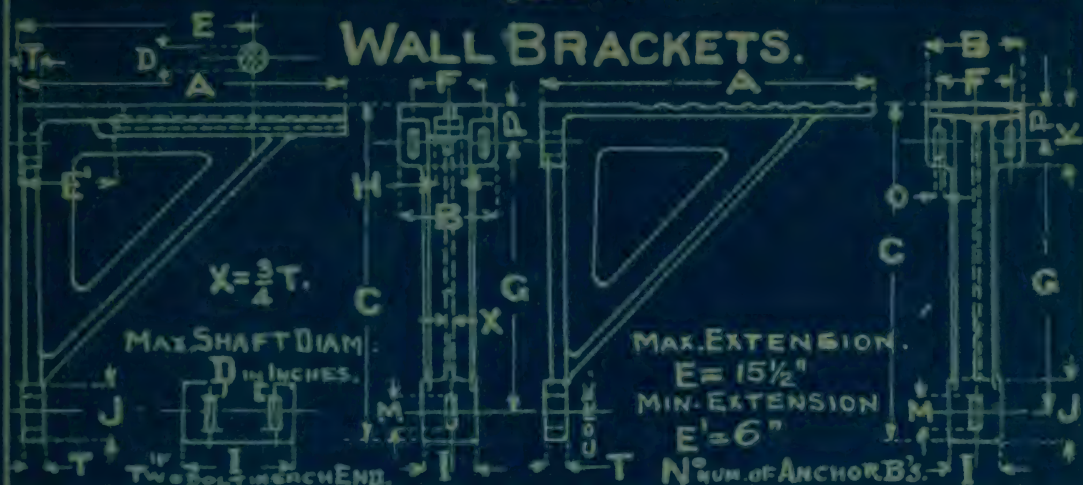
N<sup>o</sup> 2 to 4.  
THICKNESS  
BABBITT

15%	12 1/2%	11 1/2%	11%	10 1/2%	10%	9 1/2%	9%	8 1/2%	8%	7 1/2%	7%	6 1/2%	6%	5 1/2%	5%	4 1/2%	4%	3 1/2%	3%	2 1/2%	2%	1 1/2%	1%	3/4%	3/8%	3/16%	1/8%	1/16%	1/32%	1/64%	1/128%	1/256%	1/512%	1/1024%	1/2048%	1/4096%	1/8192%	1/16384%	1/32768%	1/65536%	1/131072%	1/262144%	1/524288%	1/1048576%	1/2097152%	1/4194304%	1/8388608%	1/16777216%	1/33554432%	1/67108864%	1/134217728%	1/268435456%	1/536870912%	1/1073741824%	1/2147483648%	1/4294967296%	1/8589934592%	1/17179869184%	1/34359738368%	1/68719476736%	1/137438953472%	1/274877906944%	1/549755813888%	1/1099511627776%	1/2199023255552%	1/4398046511104%	1/8796093022208%	1/17592186044416%	1/35184372088832%	1/70368744177664%	1/140737488355328%	1/281474976710656%	1/562949953421312%	1/1125899906842624%	1/2251799813685248%	1/4503599627370496%	1/9007199254740992%	1/18014398509481984%	1/36028797018963968%	1/72057594037927936%	1/144115188075855872%	1/288230376151711744%	1/576460752303423488%	1/1152921504606846976%	1/2305843009213693952%	1/4611686018427387904%	1/9223372036854775808%	1/18446744073709551616%	1/36893488147419103232%	1/73786976294838206464%	1/147573952589676412928%	1/295147905179352825856%	1/590295810358705651712%	1/1180591620717411303424%	1/2361183241434822606848%	1/4722366482869645213696%	1/9444732965739290427392%	1/18889465931478580854784%	1/37778931862957161709568%	1/75557863725914323419136%	1/151115727451828646838272%	1/302231454903657293676544%	1/604462909807314587353088%	1/1208925819614629174706176%	1/2417851639229258349412352%	1/4835703278458516698824704%	1/9671406556917033397649408%	1/19342813113834066795298816%	1/38685626227668133590597632%	1/77371252455336267181195264%	1/154742504910672534362390528%	1/309485009821345068724781056%	1/618970019642690137449562112%	1/1237940039285380274899124224%	1/2475880078570760549798248448%	1/4951760157141521099596496896%	1/9903520314283042199192993792%	1/19807040628566084398385987584%	1/39614081257132168796771975168%	1/79228162514264337593543950336%	1/158456325028528675187087900672%	1/316912650057057350374175801344%	1/633825300114114700748351602688%	1/1267650600228229401496703205376%	1/2535301200456458802993406410752%	1/5070602400912917605986812821504%	1/10141204801825835211973625643008%	1/20282409603651670423947251286016%	1/40564819207303340847894502572032%	1/81129638414606681695789005144064%	1/162259276829213363391578010288128%	1/324518553658426726783156020576256%	1/649037107316853453566312041152512%	1/1298074214633706907132624082305024%	1/2596148429267413814265248164610048%	1/5192296858534827628530496329220096%	1/10384593717069655257060992658440192%	1/20769187434139310514121985316880384%	1/41538374868278621028243970633760768%	1/83076749736557242056487941267521536%	1/166153499473114484112975882535043072%	1/332306998946228968225951765070086144%	1/664613997892457936451903530140172288%	1/1329227995784915872903807060280344704%	1/2658455991569831745807614120560689408%	1/5316911983139663491615228241121378816%	1/10633823966279326983230456482242757632%	1/21267647932558653966460912964485515264%	1/42535295865117307932921825928971030528%	1/850705917302346158658436518579420611552%	1/1701411834604692317316873037158841223008%	1/340282366920938463463374607431768245616%	1/680564733841876926926749214863536491232%	1/1361129467683753853853498429727072982464%	1/27222589353675077077069968594541459712%	1/5444517870735015415413993718908291943424%	1/10889035741470030830827987437816583886848%	1/21778071482940061661655974875633167773696%	1/43556142965880123323311949751266335547392%	1/8711228593176024664662389950253267109184%	1/1742245718635204932932477990050654218368%	1/34844
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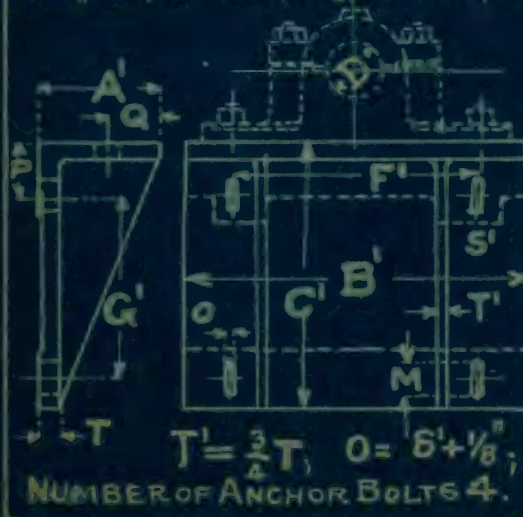
LENGTH OF BEARINGS: 1" WICKER CAPV. 1" RING- 1" CHAINWOLLING. FOR RING AND CHAIN FORMS SEE PAGE 118.115.



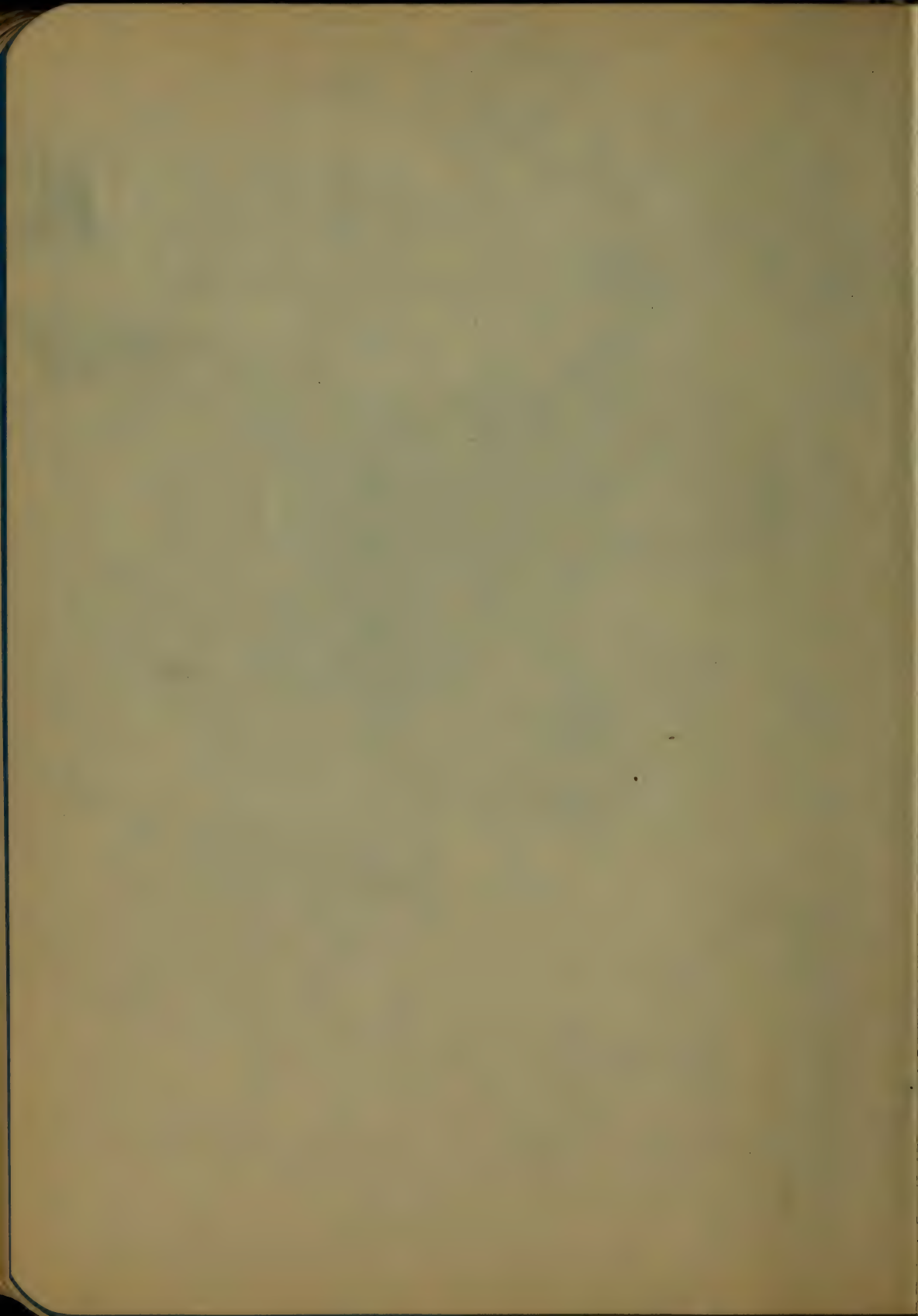
## WALL BRACKETS.



D	A	B	C	F	G	H	I	J	K	M	O	P	T	S	N°
1 5/16	19	4 1/2	13	3 1/4	10 1/2	1 1/8	3 1/2	2 1/2	3	1 1/4	3/4	1 3/4	3/16	3/8	3
1 3/8	20	5 1/4	15	3 1/2	10 1/2	7/8	4 1/4	2 5/8	3 1/8	1 1/4	3/4	1 3/4	3/8	5/8	3
1 1/2	20	4 5/8	15	3 1/4	12	7/8	4 1/2	2 3/4	3 1/4	1 3/8	7/8	2	5/8	3/4	3
1 7/16	21	6 3/4	19	4 1/2	15 1/2	1 1/8	5 1/4	2 7/8	3 1/2	1 1/8	7/8	2 1/8	3/4	7/8	3
1 5/8	21	5 1/2	19	4 1/4	15 1/2	1 1/8	6	3	3 3/4	1 1/2	1	2 1/4	3/4	7/8	3
2 3/16	22	8 1/4	23	5	19 1/2	1 3/8	7	3 1/8	3 3/8	1 1/2	1	2 1/4	3/4	7/8	4
2 1/8	23	9	27	5 3/4	23	1 3/8	7 1/2	3 1/4	4	1 1/2	1	2 1/4	7/8	7/8	4
2 1/4	23	10 1/4	30	6 1/2	25 1/2	1 3/8	7 1/2	3 3/8	4 1/8	1 1/2	1	2 1/4	7/8	7/8	4
2 3/4	24	10 1/2	32	6 3/4	27 1/2	1 3/8	9	3 1/2	4 1/4	1 3/4	1 1/8	2 3/4	7/8	1	4
3 3/16	24	11 1/4	33	7 1/4	28 1/4	1 3/8	9 1/2	3 3/8	4 1/2	1 3/4	1 1/8	2 7/8	1	1	4
3 7/16	25	12	34	8 1/4	29	1 7/8	10	3 3/4	4 3/4	2	1 1/4	3	1	1 1/8	4
3 1/8	25	12 1/2	35	8 1/2	30	1 5/8	10 1/4	4	5	2	1 1/4	3	1 1/8	1 1/8	4
3 5/16	26	13	36	9	30 1/2	1 5/8	10 1/2	4 1/4	5	2	1 1/4	3	1 1/8	1 1/8	4
4 1/16	26	13 1/8	38	9 1/2	32 1/2	1 3/4	10 3/4	4 1/8	5	2	1 1/4	3	1 3/16	1 1/8	4
4 5/16	27	14	39	10	33	1 3/4	11	4 1/2	5 1/4	2 1/4	1 3/8	3 1/4	1 3/16	1 1/4	4
5 7/16	28	14 1/2	40	10	34	1 7/8	11 1/4	4 5/8	5 1/2	2 1/2	1 3/8	3 1/4	1 1/4	1 1/4	4
5 3/8	30	15	41	10 1/2	34 1/2	1 7/8	11 1/2	4 3/4	5 1/2	2 1/4	1 3/8	3 1/4	1 3/8	1 1/4	4
6 7/16	32	15 1/2	42	11	35	2	11 3/4	4 7/8	5 3/4	2 1/2	1 5/8	3 1/2	1 1/2	1 1/2	4
6 1/2	34	16	43	11 1/2	36	2	12	5	6	2 1/2	1 5/8	3 3/4	1 3/4	1 1/2	4



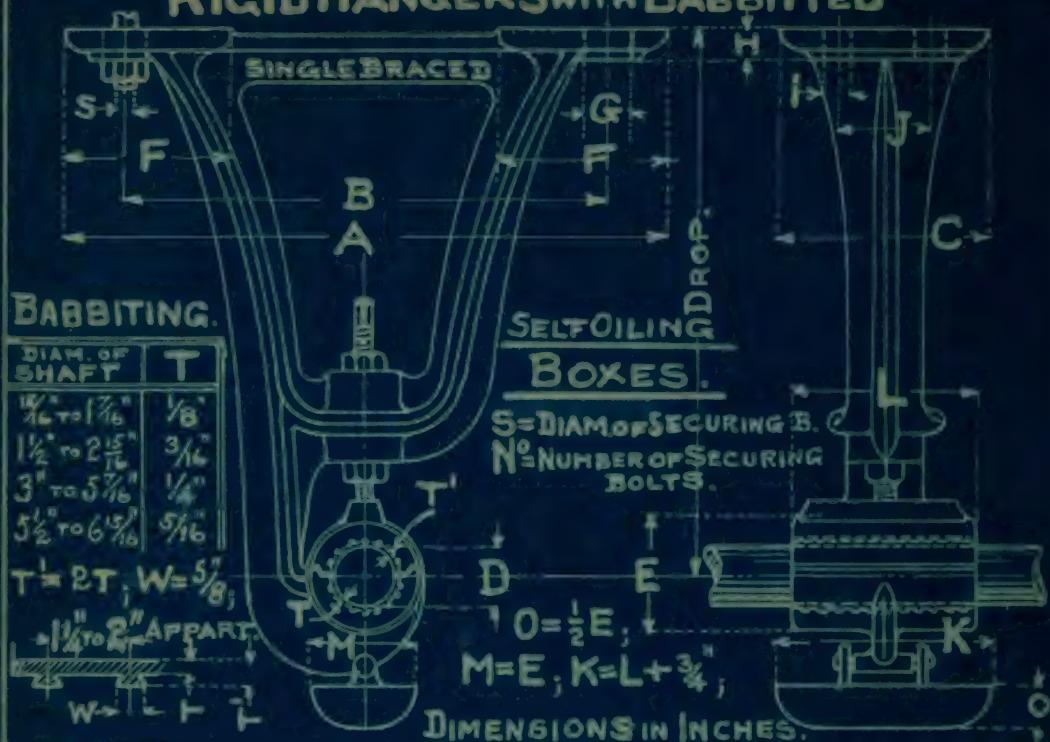
D	A'	B'	C'	F'	G'	Q	S'
2 3/16	9 1/4	15 1/2	22	12 3/8	19	4 1/2	7/8
2 1/4	11	17	23	12 1/2	20	5 1/4	1
3 3/16	11 1/2	18	25 1/2	13	21	5 3/4	1
3 7/16	12 1/2	19	27 1/2	14	22 1/2	6	1 1/8
3 5/8	13	19 1/2	29	15	24	6 1/4	1 1/8
3 11/16	13 1/2	20	30	15 1/2	25	6 1/2	1 1/8
4 1/16	14	21	30 1/2	15 3/4	26	6 3/4	1 1/4
4 5/16	14 1/2	22 1/2	32 1/2	15 3/4	27	7	1 1/4
5 7/16	15	24	33	16 1/2	27 1/2	7 1/4	1 1/2
5 3/8	15 1/2	25 1/2	33 1/2	16 1/2	28	7 1/2	1 1/2
6 7/16	16	27	34	19	28	7 3/4	1 1/2
6 1/2	16 1/2	28 1/2	34 1/2	21	28 1/2	8	1 3/4
7 7/16	17	30	35	22	29	8 1/4	1 3/4
7 1/8	17 1/8	31 1/4	35 1/2	24	29	8 1/2	1 3/4
8 7/16	18	33	36 1/2	25	30	8 3/4	1 3/4







## RIGID HANGERS WITH BABBITTED



D	DROP	A	B	C	E	F	G	H	I	J	L	S	N°
15/16	8	10 1/4	7 1/8	4 1/2	1 3/8	4	1 1/8	5/8	9/16	.	3	1/2	2
"	12	14	10 3/4	5 1/2	1 7/8	4 1/8	1 1/8	1 1/16	1 1/16	.	3	5/8	2
1 3/16	8	13 5/8	10	5	2 3/8	4 1/4	1 1/8	13/16	1 1/16	.	3 3/4	5/8	2
"	10	14 5/8	11 1/8	5 3/8	2 3/8	4 1/2	1 1/8	13/16	1 1/16	.	3 3/4	5/8	2
"	12	15 5/8	12 1/4	5 1/2	2 3/8	4 5/8	1 1/8	13/16	1 1/16	.	3 3/4	5/8	2
1 7/16	8	14	10 1/4	6	2 3/4	4 1/4	1 3/8	7/8	1 1/16	.	4 5/8	5/8	2
"	10	15 1/8	11 3/4	6	2 3/4	4 1/2	1 3/8	7/8	1 1/16	.	4 5/8	5/8	2
"	12	16	12 5/8	6	2 3/4	4 5/8	1 3/8	7/8	1 1/16	.	4 5/8	5/8	2
"	15	17 3/4	13 3/8	6 1/4	2 3/4	4 3/8	1 3/8	7/8	13/16	.	4 5/8	3/4	2
"	18	19	15 1/2	6 1/2	2 3/4	5	1 3/8	7/8	13/16	.	4 5/8	3/4	2
1 1/16	8	15 1/2	12	6 5/8	2 3/4	4 1/2	1 3/8	7/8	13/16	.	5 1/2	3/4	2
"	10	17 1/4	13	6 3/4	3 1/4	4 3/4	1 3/8	7/8	13/16	.	5 1/2	3/4	2
"	12	18	14	6 5/8	3 1/4	5	1 3/8	7/8	13/16	.	5 1/2	3/4	2
"	15	19 1/2	16 1/8	7 1/8	3 1/4	5 1/8	1 3/8	7/8	13/16	.	5 1/2	3/4	2
"	18	21 1/4	17 3/8	7 1/4	3 1/4	5 3/8	1 1/2	7/8	13/16	.	5 1/2	3/4	2
"	21	22 3/8	19 1/4	7 3/8	3 1/4	5 3/8	1 1/2	7/8	13/16	.	5 1/2	3/4	2
"	24	24 1/4	20 1/2	7 1/2	3 1/4	5 3/8	1 1/2	7/8	13/16	.	5 1/2	3/4	2
1 5/16	8	15 1/2	12	6 5/8	2 3/4	4 1/2	1 3/8	7/8	13/16	.	5 1/2	3/4	2
"	10	17 1/4	13	6 3/4	3 1/4	4 3/8	1 3/8	7/8	13/16	.	6	3/4	2
"	12	18	14	6 5/8	3 1/4	5 1/8	1 3/8	7/8	13/16	.	6	3/4	2
"	15	19 1/2	16 1/8	7 1/8	3 1/4	5 1/8	1 3/8	7/8	13/16	.	6	3/4	2
"	18	21 1/4	17 3/8	7 1/4	3 1/4	5 1/8	1 3/8	7/8	13/16	.	6	3/4	2
"	21	22 3/8	19 1/4	7 3/8	3 1/4	5 1/8	1 1/2	7/8	13/16	.	6	3/4	2
"	24	24 1/4	20 1/2	7 1/2	3 1/4	5 1/8	1 1/2	7/8	13/16	.	6	3/4	2



# RIGID HANGERS WITH BABBITTED SELF OILING BOXES FOR LOW-SPEEDS.

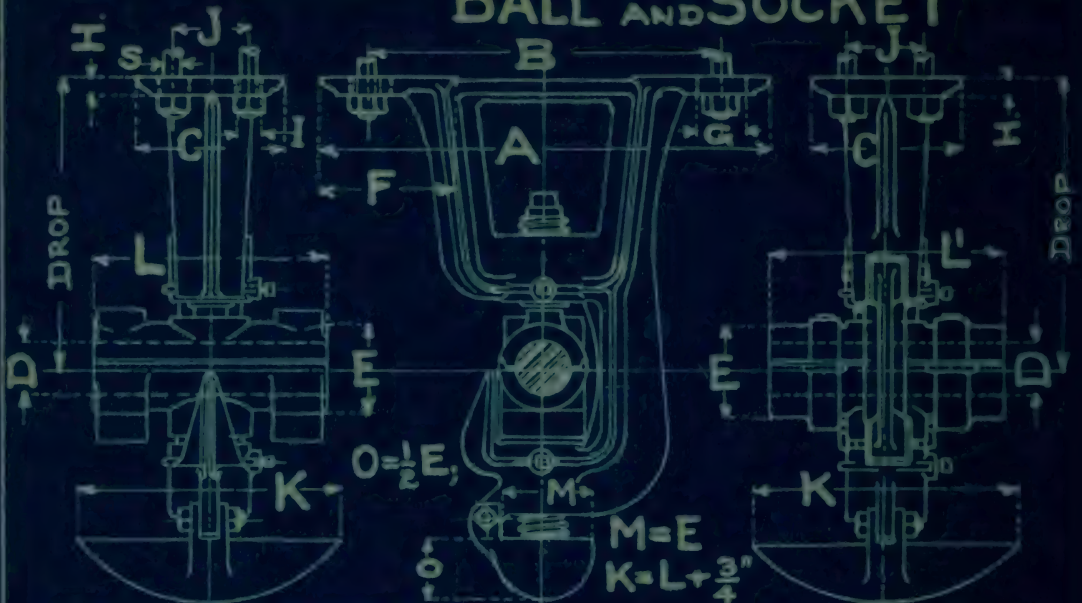
D	DROP	A	B	C	E	F	G	H	I	J	L	S	N <sup>o</sup>
2 <sup>3</sup> / <sub>16</sub>	8	17 <sup>1</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	6 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	2
"	10	18 <sup>1</sup> / <sub>4</sub>	13 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	6 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	12	19 <sup>1</sup> / <sub>4</sub>	14 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>8</sub>	"	6	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	15	20 <sup>3</sup> / <sub>4</sub>	15 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	"	6 <sup>1</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	18	22	17 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	"	6 <sup>1</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	21	23 <sup>3</sup> / <sub>4</sub>	19	8	"	6 <sup>1</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	24	25 <sup>1</sup> / <sub>2</sub>	20 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>4</sub>	"	6 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	1	1 <sup>1</sup> / <sub>4</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	8	18 <sup>1</sup> / <sub>2</sub>	13 <sup>3</sup> / <sub>8</sub>	7 <sup>5</sup> / <sub>8</sub>	4 <sup>7</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>8</sub>	•	7 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	10	19	13 <sup>3</sup> / <sub>8</sub>	8	4 <sup>7</sup> / <sub>8</sub>	6 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>8</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	12	20	15 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>8</sub>	"	6 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>8</sub>	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	15	21 <sup>1</sup> / <sub>4</sub>	16 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	"	6 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	18	23 <sup>1</sup> / <sub>8</sub>	18 <sup>1</sup> / <sub>4</sub>	8 <sup>5</sup> / <sub>8</sub>	"	6 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	21	24 <sup>3</sup> / <sub>8</sub>	19 <sup>1</sup> / <sub>4</sub>	8 <sup>3</sup> / <sub>2</sub>	"	6 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>3</sup> / <sub>16</sub>	24	26 <sup>1</sup> / <sub>2</sub>	21 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	"	6 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1	•	"	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>4</sup> / <sub>16</sub>	8	19	13 <sup>3</sup> / <sub>8</sub>	8 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>8</sub>	2	1 <sup>1</sup> / <sub>2</sub>	1	•	8 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>4</sub>	2
2 <sup>4</sup> / <sub>16</sub>	10	19 <sup>3</sup> / <sub>4</sub>	15 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>8</sub>	2	1	3 <sup>1</sup> / <sub>4</sub>	3	"	5 <sup>1</sup> / <sub>8</sub>	4
2 <sup>4</sup> / <sub>16</sub>	12	21 <sup>5</sup> / <sub>8</sub>	16 <sup>3</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>2</sub>	"	6 <sup>3</sup> / <sub>8</sub>	2	1	3 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	"	5 <sup>1</sup> / <sub>8</sub>	4
2 <sup>4</sup> / <sub>16</sub>	15	22 <sup>5</sup> / <sub>8</sub>	17 <sup>3</sup> / <sub>8</sub>	8 <sup>3</sup> / <sub>4</sub>	"	7	2	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	"	5 <sup>1</sup> / <sub>8</sub>	4
2 <sup>4</sup> / <sub>16</sub>	18	24	19 <sup>1</sup> / <sub>4</sub>	9 <sup>3</sup> / <sub>8</sub>	"	6 <sup>3</sup> / <sub>4</sub>	2	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	"	5 <sup>1</sup> / <sub>8</sub>	4
2 <sup>4</sup> / <sub>16</sub>	21	25 <sup>3</sup> / <sub>8</sub>	21	9 <sup>3</sup> / <sub>4</sub>	"	6 <sup>3</sup> / <sub>4</sub>	2	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	4	"	5 <sup>1</sup> / <sub>8</sub>	4
2 <sup>4</sup> / <sub>16</sub>	24	27	22 <sup>1</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	"	7 <sup>1</sup> / <sub>8</sub>	2	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	4	"	5 <sup>1</sup> / <sub>8</sub>	4
2 <sup>5</sup> / <sub>16</sub>	10	21	16 <sup>1</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>8</sub>	2	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	4	9	3 <sup>1</sup> / <sub>4</sub>	4
2 <sup>5</sup> / <sub>16</sub>	12	22	17 <sup>1</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>2</sub>	"	7 <sup>1</sup> / <sub>2</sub>	2	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	4	"	3 <sup>1</sup> / <sub>4</sub>	4
2 <sup>5</sup> / <sub>16</sub>	15	23 <sup>3</sup> / <sub>4</sub>	18 <sup>1</sup> / <sub>2</sub>	9 <sup>3</sup> / <sub>8</sub>	"	7 <sup>1</sup> / <sub>4</sub>	2	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
2 <sup>5</sup> / <sub>16</sub>	18	25	20	9 <sup>3</sup> / <sub>8</sub>	"	7 <sup>1</sup> / <sub>2</sub>	2	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
2 <sup>5</sup> / <sub>16</sub>	21	28	21 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	"	7 <sup>1</sup> / <sub>2</sub>	2	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	4 <sup>3</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
2 <sup>5</sup> / <sub>16</sub>	24	28 <sup>3</sup> / <sub>4</sub>	23 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	"	7 <sup>1</sup> / <sub>2</sub>	2	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	4 <sup>3</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	12	23	17 <sup>1</sup> / <sub>4</sub>	9 <sup>5</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	5	9 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	15	24 <sup>1</sup> / <sub>4</sub>	18 <sup>1</sup> / <sub>4</sub>	9 <sup>7</sup> / <sub>8</sub>	"	6 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	18	25 <sup>1</sup> / <sub>4</sub>	19 <sup>1</sup> / <sub>4</sub>	9 <sup>3</sup> / <sub>8</sub>	"	6 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1	5 <sup>1</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>1</sup> / <sub>16</sub>	21	26 <sup>1</sup> / <sub>4</sub>	20 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>8</sub>	"	6 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1	5 <sup>1</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>1</sup> / <sub>16</sub>	24	27 <sup>1</sup> / <sub>4</sub>	21 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>8</sub>	"	7 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1	5 <sup>1</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>1</sup> / <sub>16</sub>	15	24 <sup>3</sup> / <sub>4</sub>	19 <sup>1</sup> / <sub>2</sub>	9 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	10 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	18	25 <sup>1</sup> / <sub>2</sub>	19 <sup>3</sup> / <sub>8</sub>	10	"	7 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	21	26 <sup>3</sup> / <sub>8</sub>	20 <sup>3</sup> / <sub>4</sub>	10	"	7 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	1	5 <sup>1</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>1</sup> / <sub>16</sub>	24	27 <sup>1</sup> / <sub>2</sub>	21 <sup>5</sup> / <sub>8</sub>	10	"	7 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	1	5 <sup>3</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>1</sup> / <sub>16</sub>	15	25 <sup>1</sup> / <sub>2</sub>	17 <sup>3</sup> / <sub>8</sub>	10 <sup>1</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	18	26 <sup>1</sup> / <sub>4</sub>	19 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>4</sub>	"	7 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>1</sup> / <sub>16</sub>	21	28 <sup>1</sup> / <sub>4</sub>	22 <sup>5</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>4</sub>	"	7 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	1	5 <sup>1</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>1</sup> / <sub>16</sub>	24	29 <sup>3</sup> / <sub>4</sub>	23 <sup>1</sup> / <sub>2</sub>	11	"	7 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	1	5 <sup>3</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>15</sup> / <sub>16</sub>	15	26 <sup>3</sup> / <sub>4</sub>	20	10 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	12	3 <sup>1</sup> / <sub>4</sub>	4
3 <sup>15</sup> / <sub>16</sub>	18	27 <sup>1</sup> / <sub>2</sub>	21 <sup>1</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	"	7 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	1	5 <sup>1</sup> / <sub>4</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>15</sup> / <sub>16</sub>	21	28 <sup>3</sup> / <sub>4</sub>	21 <sup>3</sup> / <sub>8</sub>	10 <sup>5</sup> / <sub>8</sub>	"	7 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1	5 <sup>3</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4
3 <sup>15</sup> / <sub>16</sub>	24	29 <sup>1</sup> / <sub>2</sub>	22 <sup>1</sup> / <sub>2</sub>	11	"	7 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1	5 <sup>5</sup> / <sub>8</sub>	"	3 <sup>1</sup> / <sub>8</sub>	4







# 123 BALL AND SOCKET



**SINGLE BRACED HANGER WITH  
WICK OR CAPILLARY OILING  
BEARINGS. BABBITTED OR WITH  
BRASS BUSHINGS.**

**DOUBLE  
RING  
BABBITTED OR  
ALL DIMENSIONS**

D	DROP	BEARINGS			A	B	C	E	F	G	H	I	J	S	N
		L	L'	L''											
15/16	8	5	•	•	10 1/4	8 3/8	3 1/2	1 7/8	4 1/8	1	9/16	9/16	•	1/2	2
TO	10	5 1/4	•	•	12	9 5/8	3 7/8	"	4 1/8	1	9/16	9/16	•	1/2	2
13/16	12	6	5 3/4	•	13 1/4	10 3/4	4 1/4	"	4 1/8	1	5/8	9/16	•	5/8	2
13/16	14	6 1/4	7 1/8	7 1/4	15	12 3/8	4 5/8	2 3/8	4 1/8	1	5/8	1 1/16	•	5/8	2
13/16	8	6	7 1/4	7 3/8	13 3/8	10 3/8	4 1/4	3	4 1/4	1 1/8	7/8	1 1/16	•	5/8	2
"	10	7	"	"	14 3/4	11 3/4	4 1/2	"	4 1/4	1 1/8	7/8	1 1/16	•	5/8	2
"	12	"	"	"	15	12 1/2	4 3/4	"	4 1/4	1 1/4	7/8	1 1/16	•	5/8	2
"	15	"	"	"	18	14 1/2	5	"	4 3/8	1 1/4	1	1 1/16	•	5/8	2
"	18	"	"	"	20 3/8	17	5 1/4	"	4 3/8	1 1/4	1	1 1/16	•	3/4	2
"	21	"	"	"	21 1/8	17 1/2	5 3/8	"	4 3/8	1 3/8	1	1 1/16	•	3/4	2
1 1/16	8	7	8 3/8	8 1/2	14 3/8	10 3/8	4 1/4	3 3/8	4 3/8	1 3/8	1 5/16	1 1/16	•	5/8	2
"	10	7	"	"	15 3/8	12	4 1/4	"	4 3/8	1 3/8	1 5/16	1 1/16	•	5/8	2
"	12	8 1/4	8 1/2	8 3/4	16 1/4	13	4 1/2	"	5 3/8	1 3/8	1	1 3/16	•	3/4	2
"	15	"	"	"	18	14 1/2	4 3/4	"	5 3/8	1 1/2	1	1 3/16	•	3/4	2
"	18	"	"	"	19 1/4	15 1/2	5	3 1/2	5 3/8	1 1/2	1	1 3/16	•	3/4	2
"	21	"	"	"	21	17 3/8	5 1/4	"	5 3/8	1 1/2	1	1 3/16	•	3/4	2
"	24	"	"	"	22 3/4	19 3/8	5 3/8	"	6	1 1/2	1	1 3/16	•	3/4	2
1 1/8	8	8 1/2	9 1/4	9	15 3/8	10 3/8	5 3/8	3 3/8	5 1/2	1 3/8	1	1 1/16	•	5/8	2
"	10	8 1/2	9 3/8	9 1/4	17	12 3/4	6 3/8	4	5 1/2	1 3/8	1	1 1/16	•	5/8	2
"	12	8 3/8	9 3/8	9 1/2	18	14	6 3/4	"	5 3/4	1 1/2	1 1/8	1 3/16	•	3/4	2
"	15	9 1/4	9 3/8	"	19 1/2	15 3/8	7	"	5 3/4	1 1/2	1 1/8	1 3/16	•	3/4	2
"	18	"	"	"	21	17 1/4	7	"	5 3/4	1 3/8	1 1/4	1 5/16	•	7/8	2
"	21	"	"	"	22 1/2	19	7 1/4	"	6	1 3/4	1 1/4	1 5/16	•	7/8	2
"	24	"	"	"	24	20 3/8	7 1/4	"	6	1 3/4	1 1/4	1 5/16	•	7/8	2



## DROP HANGERS.



BRACED HANGER WITH  
OILING BEARINGS.  
WITH BRASS BUSHINGS.  
IN INCHES.

DOUBLE BRACED HANGER WITH  
CHAIN OILING BEARINGS.  
BABBITTED OR BRASS BUSHED.  
N = NUMBER OF SECURING BOLTS.

I AND G ARE CORE HOLES.

D	Drop	BEARINGS.			A	B	C	E	F	G	H	I	J	S	N°
		L	L'	L''											
2 3/16	8	9	10 1/2	9 1/2	16 1/4	11 5/8	5 1/2	4 1/4	5 1/2	15/8	1 1/8	1 5/16	•	3/4	2
"	10	9 1/2	10 5/8	10 1/2	17 1/2	12 3/4	6 3/4	4 3/8	5 1/2	15/8	1 1/8	1	•	7/8	2
"	12	10 1/4	11 1/4	"	19	14 1/2	7 1/4	"	5 3/4	1 3/4	1 1/4	1	•	7/8	2
"	15	"	"	"	20	15 1/4	7 1/2	"	5 3/4	1 3/4	1 1/4	1	•	7/8	2
"	18	"	"	"	21 1/2	17	7 3/4	"	5 3/4	1 3/4	1 3/8	1	•	7/8	2
"	21	"	"	"	23 1/4	18 1/2	7 3/4	4 1/2	5 3/4	1 3/4	1 3/8	1 1/8	•	1	2
"	24	"	"	"	25	20 1/4	8	"	5 3/4	1 3/4	1 1/2	1 1/8	•	1	2
"	30	"	11 1/2	10 3/4	27 1/2	23 3/4	8 1/4	"	6	1 3/8	1 1/2	1 1/8	•	1	2
2 3/8	10	10 1/2	12 1/4	11 1/4	18	14 1/4	6 3/4	4 3/8	6	1 3/4	1 1/4	1	•	7/8	2
"	12	11	"	"	18 3/4	14 1/2	6 3/8	4 3/8	6 1/4	1 3/4	1 1/4	1	•	7/8	2
"	15	11 3/8	"	11 3/4	19 1/4	15	7	5	6 1/4	2	1 1/4	1 1/8	•	1	2
"	18	"	"	"	21 1/8	18	7 1/2	"	6 1/2	2	1 3/8	7/8	3 1/2	3/4	4
"	21	"	12 3/4	"	24 1/2	20	8 1/2	"	6 1/2	2	1 3/8	7/8	4 1/2	3/4	4
"	24	"	"	"	26	21 5/8	8 3/4	"	6 3/4	2	1 3/8	7/8	5	3/4	4
"	30	"	"	"	28 1/2	24	9	"	6 3/4	2	1 3/8	7/8	5 1/4	3/4	4
"	36	"	"	"	29 3/4	24 1/4	9 1/4	"	6 3/4	2	1 3/8	7/8	5 3/4	3/4	4
2 7/16	10	11 1/2	13	12 1/4	20 3/4	16	8 3/4	5 1/4	6 1/4	2	1 1/2	7/8	4	3/4	4
"	12	"	"	"	21	16	9	"	6 1/2	2	1 1/4	7/8	4	3/4	4
"	15	12	13 1/2	"	22 1/2	17 1/2	9 1/4	5 3/8	6 3/4	2	1 1/4	1	4 1/8	7/8	4
"	18	"	"	"	23 3/4	18 1/2	9 1/2	"	6 3/4	2	1 3/8	1	4 3/8	7/8	4
"	21	12 3/8	"	12 3/4	25 1/2	21	9 1/2	5 1/2	6 3/8	2	1 3/8	1	4 1/4	7/8	4
"	24	"	"	"	27	22 1/4	9 3/4	"	6 3/8	2	1 1/2	1	5 1/4	7/8	4
"	30	"	14	"	29 3/4	23 1/8	9 3/4	"	7	2	1 1/2	1 1/8	5 1/4	1	4
"	36	"	"	"	32 1/4	26	9 3/4	"	7	2 1/4	1 1/2	1 1/8	5 3/8	1	4







## BALL &amp; SOCKET DROP HANGERS.

BASES OF HANGERS ARE MACHINE FINISHED. BEARINGS HAVE  
I & GAKE CORE HOLES. SCREW ADJUSTMENTS.

D	DROP	BEARINGS.			A	B	C	E	F	G	H	I	J	SN	
		L	L'	L''											
2 1/16	10	12 1/2	14 1/4	15 1/2	21 1/2	16 1/2	10	5 3/4	6 1/2	2 1/4	1 1/4	1	5 1/4	7/8	4
"	12	13	14 1/4	"	22	16 3/4	10	"	6 1/2	2 1/4	1 1/4	1	5 1/4	7/8	4
"	15	13 1/2	14 5/8	"	23 1/2	18 1/4	10 1/2	"	6 1/2	2 1/4	1 3/8	1	5 1/4	7/8	4
"	18	"	"	15 3/8	24 3/4	20 1/4	10 3/4	5 3/8	6 1/2	2 1/4	1 3/8	1 1/8	5 1/4	1	4
"	21	"	"	"	26 1/2	21 1/2	10 3/4	"	6 3/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	24	"	"	"	28	23	10 3/4	6	6 3/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	30	"	"	"	29	23 1/2	10 3/4	"	7	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	36	"	"	"	31	24 1/2	10 3/4	"	7	2 1/4	1 1/2	1 1/4	5 1/4	1 1/8	4
3 3/16	10	12 3/8	14 7/8	14	23	17 1/4	8 1/2	6 1/4	6 1/2	2 1/4	1 1/4	1	4 3/8	7/8	4
"	12	"	"	"	25 1/8	19 3/4	10	6 3/8	6 1/2	2 1/4	1 1/4	1	5	7/8	4
"	15	13 3/4	15 3/8	14 1/2	25 3/8	20	10 1/8	"	6 1/2	2 1/4	1 3/8	1	5 1/4	7/8	4
"	18	"	"	"	27 1/4	21 1/4	10 1/8	6 1/2	6 1/2	2 1/4	1 3/8	1 1/8	5 1/4	1	4
"	21	14 1/2	15 3/8	15	28 1/2	23	10 1/2	"	6 3/4	2 1/4	1 3/8	1 1/8	5 1/4	1	4
"	24	"	"	"	30	24 1/2	10 1/2	"	6 3/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	30	"	"	"	31 1/2	25 1/2	10 1/2	"	7	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	36	"	"	"	32 1/2	26	10 1/2	"	7	2 1/4	1 1/2	1 1/4	5 1/4	1 1/8	4
3 1/2	12	14 3/4	16 1/4	"	25 1/2	18 1/2	10	6 3/4	6 1/2	2 1/4	1 3/8	1	5 1/4	7/8	4
"	15	"	16 3/4	"	27 1/2	21	10 1/4	"	6 1/2	2 1/4	1 3/8	1	5 1/4	7/8	4
"	18	"	17 1/4	15 3/8	28 3/8	22 1/4	10 1/2	"	6 3/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	21	15 1/2	"	"	30 1/2	23 1/2	10 3/4	6 3/8	6 3/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	30	"	"	"	32 1/2	25 1/2	11	"	7	2 1/4	1 1/2	1 1/8	6	1	4
"	36	"	17 3/4	15 3/8	33	26 1/2	11 1/2	7	7 1/4	2 1/4	1 1/2	1 1/4	6 1/2	1 1/8	4
3 5/8	12	"	18	"	26 1/2	20 3/8	10	7 1/4	6 3/4	2 1/4	1 3/8	1	5 1/4	7/8	4
"	15	16	"	16 1/4	27 1/4	21	10 1/4	"	6 3/4	2 1/4	1 1/2	1	5 1/4	7/8	4
"	18	"	"	"	28 3/8	23 3/8	10 3/8	7 1/2	7	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	21	16 1/2	18 1/2	16 3/4	29 1/4	24	10 1/2	"	7	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	24	"	"	"	30 1/4	25	10 1/2	"	7	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	30	"	"	"	32 1/4	26	11	"	7	2 1/4	1 1/2	1 1/4	6	1 1/8	4
"	36	"	"	"	33	26 1/2	11 1/2	"	7 1/4	2 1/4	1 1/2	1 1/4	6 1/2	1 1/8	4
3 15/16	15	17	18 1/2	17 1/2	27 1/2	21 3/4	10 1/4	7 1/4	7	2 1/4	1 3/8	1	5 1/4	7/8	4
"	18	17 1/4	"	"	29	23 1/2	10 3/8	"	7 1/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	21	17 1/2	"	"	29 1/2	24 1/4	10 3/8	8	7 1/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	24	"	20	"	32	26 1/4	10 3/8	"	7 1/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	30	"	"	"	33 1/2	27 1/4	11	"	7 1/4	2 1/4	1 1/2	1 1/4	6	1 1/8	4
"	36	17 3/8	20 1/4	"	35 3/8	30 3/8	11 1/2	"	7 1/2	2 1/4	1 1/2	1 1/4	6 1/2	1 1/8	4
4 1/16	15	18 1/8	19	18	28 1/2	22 1/4	10 1/4	8 3/8	7 1/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	18	"	20	"	30	22 3/4	10 1/2	"	7 1/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	21	18 1/2	20 1/4	18 3/4	31 1/2	24	10 3/4	"	7 1/4	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	24	"	21	"	33	25 1/2	11	8 3/4	7 1/2	2 1/4	1 1/2	1 1/8	6	1 1/8	4
"	30	18 3/8	"	19 1/2	34	26 1/2	11 1/2	"	7 1/2	2 1/4	1 1/2	1 1/8	6 1/2	1 1/8	4
"	36	"	"	"	36 1/2	28	12	"	7 3/4	2 1/4	1 1/2	1 1/8	6 3/8	1 1/8	4
4 15/16	18	"	"	"	30 1/4	23 1/4	10 1/2	9 1/4	7 1/2	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	21	"	21 1/2	"	31 1/4	25	10 3/4	"	7 1/2	2 1/4	1 1/2	1 1/8	5 1/4	1	4
"	24	"	"	"	33	25 1/2	11	9 1/2	8	2 1/4	1 1/2	1 1/8	6	1 1/8	4

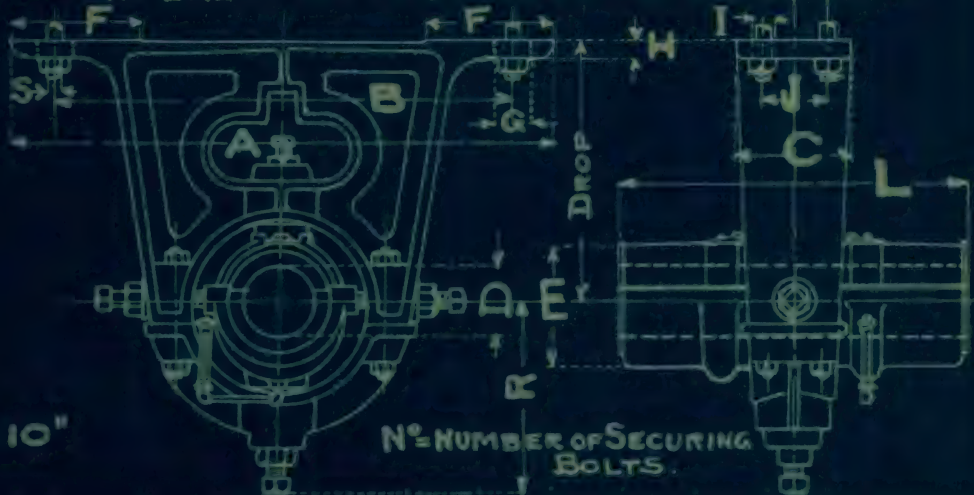
## BALL &amp; SOCKET DROP HANGERS.

HANGER BASES ARE MACHINE FINISHED. BEARINGS HAVE SCREW ADJUSTMENTS. I & G ARE CORE HOLES.

D	DROP	BEARINGS.			A	B	C	E	F	G	H	I	J	S	N°
		L	L'	L"											
4 <sup>1</sup> / <sub>16</sub>	30	18 <sup>3</sup> / <sub>8</sub>	22	20	35	28	11 <sup>1</sup> / <sub>2</sub>	10	8 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	36	"	"	"	37	30	12	10	9 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	4
5 <sup>7</sup> / <sub>16</sub>	18	21 <sup>1</sup> / <sub>4</sub>	23	21	31 <sup>1</sup> / <sub>4</sub>	24	10 <sup>1</sup> / <sub>2</sub>	10	8 <sup>1</sup> / <sub>2</sub>	2 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>4</sub>	1	4
"	21	"	"	"	32 <sup>1</sup> / <sub>2</sub>	24 <sup>1</sup> / <sub>2</sub>	10 <sup>3</sup> / <sub>4</sub>	"	9 <sup>1</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6	1	4
"	24	21 <sup>1</sup> / <sub>2</sub>	23 <sup>1</sup> / <sub>2</sub>	"	33 <sup>1</sup> / <sub>2</sub>	26	11	"	9 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	30	"	"	"	35 <sup>1</sup> / <sub>2</sub>	28 <sup>1</sup> / <sub>2</sub>	12	10 <sup>7</sup> / <sub>8</sub>	10	2 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	36	22	24	22	37 <sup>1</sup> / <sub>2</sub>	29 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	"	10	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	7	1 <sup>1</sup> / <sub>8</sub>	4
5 <sup>15</sup> / <sub>16</sub>	21	"	"	23	32 <sup>3</sup> / <sub>4</sub>	25	11	11 <sup>3</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6	1	4
"	24	"	25 <sup>1</sup> / <sub>4</sub>	"	34 <sup>1</sup> / <sub>4</sub>	27 <sup>1</sup> / <sub>2</sub>	12	"	10	3	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	30	23 <sup>1</sup> / <sub>4</sub>	"	24	36	27 <sup>1</sup> / <sub>2</sub>	13	12	10	3	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	36	"	27 <sup>1</sup> / <sub>8</sub>	"	38 <sup>1</sup> / <sub>8</sub>	31 <sup>1</sup> / <sub>8</sub>	14	"	10	3	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4
6 <sup>7</sup> / <sub>16</sub>	21	24	"	"	33 <sup>3</sup> / <sub>4</sub>	25 <sup>1</sup> / <sub>4</sub>	12	12 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	1	4
"	24	"	28 <sup>1</sup> / <sub>4</sub>	26	35	27 <sup>1</sup> / <sub>2</sub>	13	"	10	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	30	25	29 <sup>1</sup> / <sub>4</sub>	"	38	29 <sup>1</sup> / <sub>2</sub>	14 <sup>1</sup> / <sub>4</sub>	13	10	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4
"	36	27	30 <sup>1</sup> / <sub>2</sub>	28	40 <sup>1</sup> / <sub>2</sub>	30 <sup>1</sup> / <sub>2</sub>	15	"	10	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	9 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4

## HEAD SHAFT HANGERS,

WITH BALL & SOCKET, RING OILING BEARINGS.



D	DROP	L	A	B	C	E	R	G	H	I	J	S	N°
3 <sup>1</sup> / <sub>16</sub>	12	17 <sup>3</sup> / <sub>4</sub>	33	27 <sup>1</sup> / <sub>2</sub>	8	6 <sup>7</sup> / <sub>8</sub>	13 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	1	4
3 <sup>15</sup> / <sub>16</sub>	14	18 <sup>3</sup> / <sub>4</sub>	33 <sup>3</sup> / <sub>4</sub>	28	8	7 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	1	4
3 <sup>15</sup> / <sub>16</sub>	16	20	34 <sup>1</sup> / <sub>2</sub>	29	8	8	13 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	1	4
4 <sup>3</sup> / <sub>16</sub>	18	22	35 <sup>1</sup> / <sub>2</sub>	30	8	8	13 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	1	4
4 <sup>3</sup> / <sub>16</sub>	12	22	36	30	9	8 <sup>7</sup> / <sub>8</sub>	14	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	5	1 <sup>1</sup> / <sub>8</sub>	4
4 <sup>11</sup> / <sub>16</sub>	14	23	37	31	9	9 <sup>1</sup> / <sub>2</sub>	14	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	5	1 <sup>1</sup> / <sub>8</sub>	4
4 <sup>15</sup> / <sub>16</sub>	16	24	37	31	9	9	14	3	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	5	1 <sup>1</sup> / <sub>8</sub>	4
5 <sup>7</sup> / <sub>16</sub>	18	24	38	32	9	10 <sup>7</sup> / <sub>8</sub>	14	3	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	5	1 <sup>1</sup> / <sub>8</sub>	4
5 <sup>7</sup> / <sub>16</sub>	12	25 <sup>1</sup> / <sub>4</sub>	38	32	10	10 <sup>7</sup> / <sub>8</sub>	15 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6	1 <sup>1</sup> / <sub>4</sub>	4
5 <sup>15</sup> / <sub>16</sub>	14	27 <sup>1</sup> / <sub>8</sub>	38	32	10	12	15 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6	1 <sup>1</sup> / <sub>4</sub>	4
6 <sup>7</sup> / <sub>16</sub>	16	29 <sup>1</sup> / <sub>4</sub>	39	33	10	13	15 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6	1 <sup>1</sup> / <sub>4</sub>	4
6 <sup>7</sup> / <sub>16</sub>	18	29 <sup>1</sup> / <sub>4</sub>	40	34	10		15 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	6	1 <sup>1</sup> / <sub>4</sub>	4

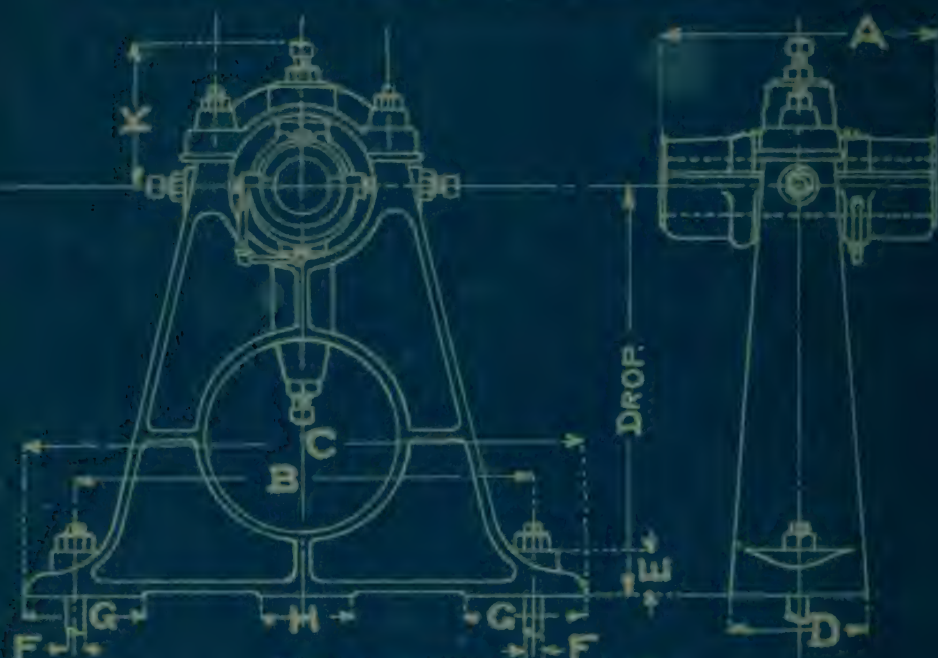








# DIMENSIONS OF BALL AND SOCKET RING-OILING FLOOR STANDS.

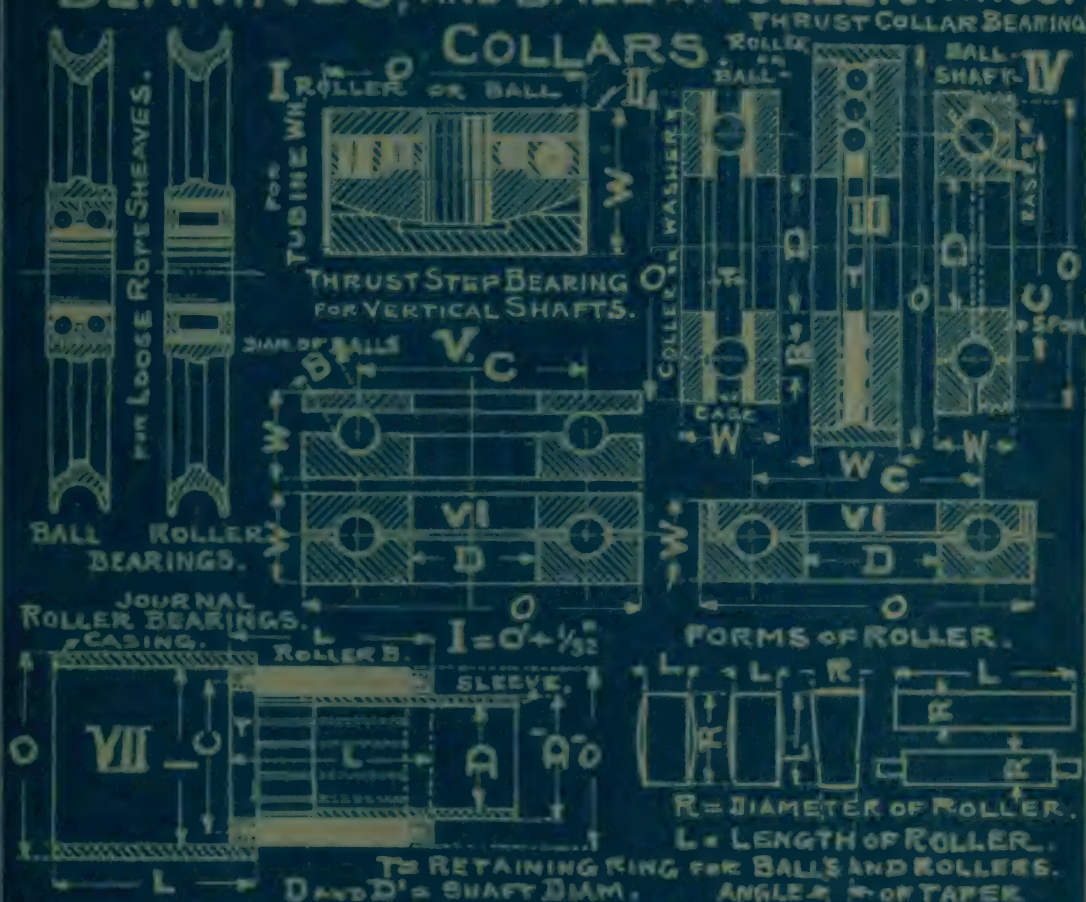


DIMENSIONS IN INCHES.

DIAM. OF SHAFT.	HORSE- POWER 100 R.P.M.	20 IN. DROP.		30" DROP.		36" DROP.		42" DROP.		48" DROP.		A	D	E	F	G	H	K
		B	C	B	C	B	C	B	C	B	C							
2 1/8"	10.1	28 1/2	36 1/2	32 1/2	40 1/2	35	43	37 1/2	45 1/2	40 1/2	48 1/2	14 3/4	10	2	1 1/8	8 1/2	8	10 1/2
3 3/8"	16	32	40	36 1/2	45	39	48	42	51	45	54	17 1/2	12	2 1/4	1 1/4	10 1/2	8	12
3 5/8"	24	32	40	36 1/4	45	39	49	42	51	45	54	20	12	2 1/4	1 1/4	10 1/2	8	12
4 1/8"	33 1/2	32	41	36 1/2	45 1/2	40	48	43 1/2	52 1/2	47	56	22	12	2 1/2	1 1/4	10 1/2	8	13
4 5/8"	46.9	32	41	36 1/2	45 1/2	40	49	43 1/2	52 1/2	47	56	24	12	2 1/2	1 1/4	10 1/2	8	13
5 3/8"	62.4	37	45 1/2	42	50	44 1/2	53	48	56	51	59	25 1/2	14	2 3/4	1 3/8	12	8	15
5 5/8"	81.6	37	45 1/2	42	50	44 1/2	53	48	56	51	59	27 1/2	14	2 3/4	1 3/8	12	10	15
6 3/8"	102.4	37	45 1/2	42	53 1/2	44 1/2	53	48	56	51	59	29 1/2	14	2 3/4	1 1/2	12	10	15
6 5/8"	128.4	50	58 1/2	55	63 1/2	57 1/2	66	60 1/2	69	63 1/2	72	31 1/4	16	3	1 1/2	12	10	19 1/2
7 3/8"	154.5	50	58 1/2	55	63 1/2	57 1/2	66	60 1/2	69	63 1/2	72	33 1/2	16	3	1 1/2	12	12	19 1/2
7 5/8"	187.1	50	58 1/2	55	63 1/2	57 1/2	66	60 1/2	69	63 1/2	72	35 1/2	16	3	1 1/2	12	12	19 1/2
8 1/8"	267.7	.	.	53	61 1/2	56	64	58	68	62 1/4	70	34	16	3 1/4	1 3/8	12	12	20
9 1/8"	328.2	.	.	52 1/2	59 1/2	55	62	58	65	61	68	35	16	3 1/2	1 3/4	12	12	20
10 3/8"	360	.	.	.	.	59	66	62	69	64	71	36	16	4	1 3/4	14	14	21



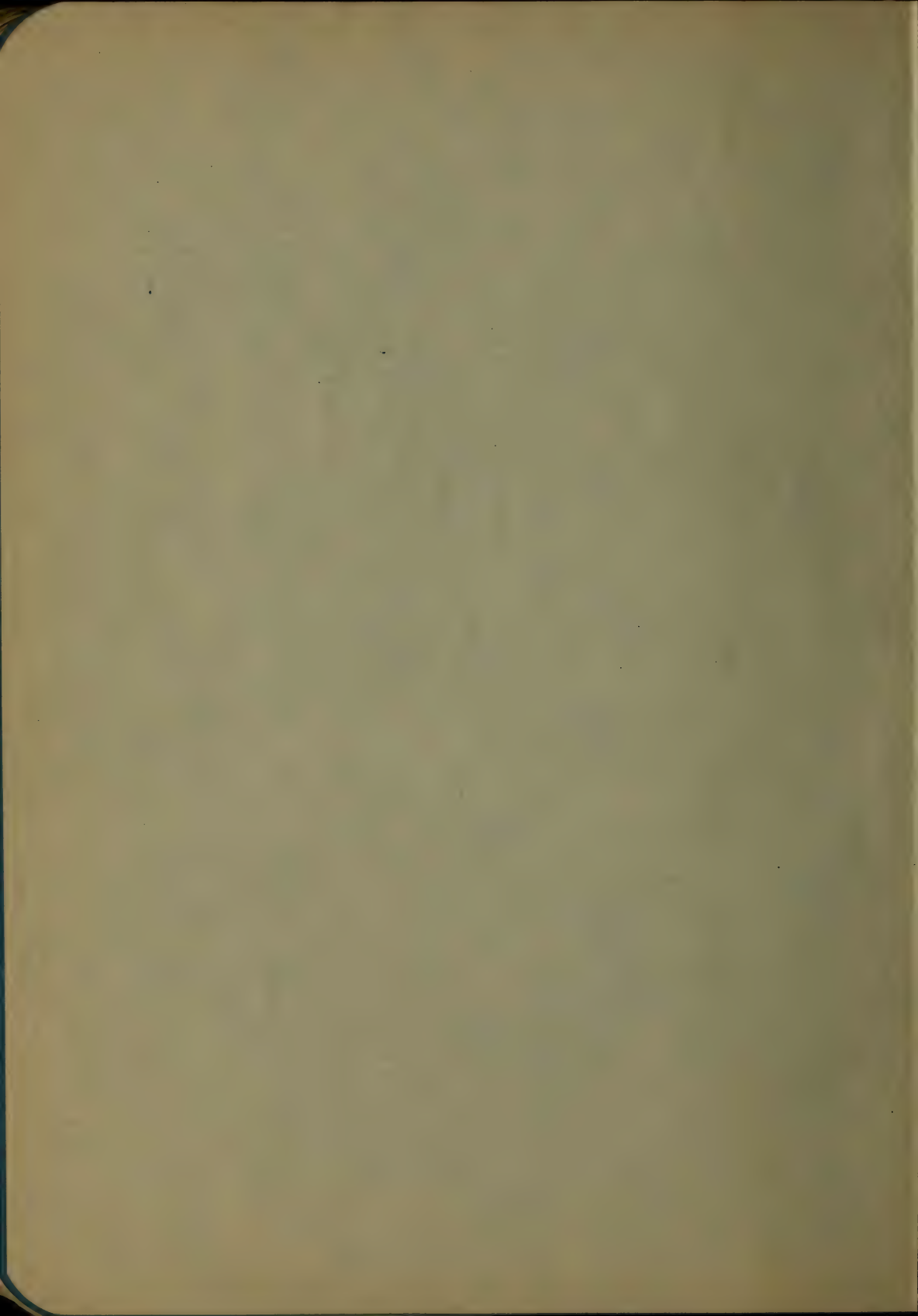
# BALL AND ROLLER BEARINGS, AND BALL & ROLLER THRUST COLLARS



## TAPERS PER FOOT AND CORRESPONDING ANGLES FOR ROLLERS.

TAPER INCHES PER FOOT	INCLUDED ANGLE.	ANGLE CENTER L.	TAPER	I. ANGLE	ANGLE OF CENTER LINE	TAPER	INCLUD. ANGLE.	ANGLE CENT. LINE
$\frac{1}{16}$	0°-18'	0°-9'	$\frac{3}{8}$	1°-47'	0°-54'	$\frac{3}{8}$	4°-11'	2°-08'
$\frac{1}{8}$	0°-36'	0°-18'	$\frac{7}{16}$	2°-05'	1°-02'	1"	4°-46'	2°-23'
$\frac{3}{16}$	0°-54'	0°-27'	$\frac{1}{2}$	2°-23'	1°-12'	$1\frac{1}{2}$	7°-09'	3°-35'
$\frac{1}{4}$	1°-12'	0°-36'	$\frac{5}{8}$	2°-59'	1°-30'	2	9°-31'	4°-46'
$\frac{5}{16}$	1°-30'	0°-45'	$\frac{3}{4}$	3°-55'	1°-47'	$2\frac{1}{2}$	11°-54'	5°-57'





## DIMENSIONS AND BEARING CAPACITY

## BALL & ROLLER BEARINGS AND THRUST COLLARS

MAXIMUM LOAD ON BALLS OR ONE INCH LENGTH OF ROLLERS  $L_M$

## I THRUST STEP BEARINGS.

## V. BALLTHRUSTS.

BALL THRUST.					ROLLER.			LOAD IN TONS/BEARINGS.				
O	W	B	L <sub>N</sub>	R.P.M.	O	W	LOAD.	D	O	B	W	L <sub>M</sub>
1 1/2	1 1/16	5/16	100	350	2 1/4	1	800	1 9/16	2 1/2	3/8	3/4	5
2	1 3/8	5/8	150	350	2 1/2	1 1/8	1000	2 1/16	3 5/16	1/2	1 1/8	10
2 1/4	2	3/4	200	300	3	1 1/4	1200	2 5/8	4 1/16	1/2	1 5/16	20
2 7/16	2	3/4	240	300	3 1/4	1 1/2	1400	3 1/16	4 1/16	5/8	1 7/16	30
2 1/2	2	3/4	300	300	3 1/2	1 1/2	1600	FOR REVOLUTIONS FROM 10 TO 25 R.P.M.				
3	2	3/4	400	300	3 3/4	1 1/2	2000					
3 1/2	2	3/4	500	280	4	1 1/2	2200	VI END THRUST B. BALLS.				
4	2	3/4	600	280	4 1/2	1 1/2	2400					
4 7/16	2	3/4	700	260	5	1 3/4	3000	D	O	W	B	L <sub>M</sub>
4 3/4	2	3/4	900	260	5 1/2	1 7/8	3500	1 1/4	2 1/2	1 1/16	5/16	440
5	2	3/4	1000	260	6	2	4000	1 1/4	3	1 1/16	5/16	475
6	2 1/8	3/4	1500	250	7	2 1/2	4400	1 7/8	3 15/32	1	1/2	600
6 1/2	2 1/4	1	1600	250	8	2 1/4	5000	2 1/4	4	1 1/4	1/2	720
7 1/2	2 1/2	1	2000	250	9	2 1/2	6000	2 5/16	3 3/32	1	1/2	800
8	2 1/2	1	2200	240	10	3	7000	2 1/2	4 1/4	1	1/2	800
10	3	1	4000	220	FOR MED. SPEEDS FROM 25 TO 300 R.P.M.			3 1/4	4 7/32	1	1/2	1000
11	3	1	4500	210				3 1/2	5 1/4	1	1/2	1040
12	4	1	6000	200				4 1/4	5 5/8	1	3/8	1170
16	4	1 1/4	9000	180								

### III. THRUST COLLARS

BALLS • LEAD • LBS

D	O	C	W	MAE. LOAD.	MAE. P.D.M.
1½	3½	2½	1¼	800	500
1¾	4½	3½	1½	1800	500
2	5½	3¾	1⅝	1600	450
2¼	6	4⅛	1⅝	1800	400
2½	6	4¼	1⅝	1800	400
2¾	6	4⅜	1⅝	1800	400
3	6½	4¾	1¾	2000	350
3½	7½	5½	1⅞	2200	350
3¾	7½	5¼	1⅞	2200	350
4	8	6	2	2500	300
5	10	7½	2	3000	250
6	11	8½	2¼	4000	200
7	13	10	2½	4500	180
8	14	11	2¾	6000	160

## III THRUST COLLAR BEARINGS

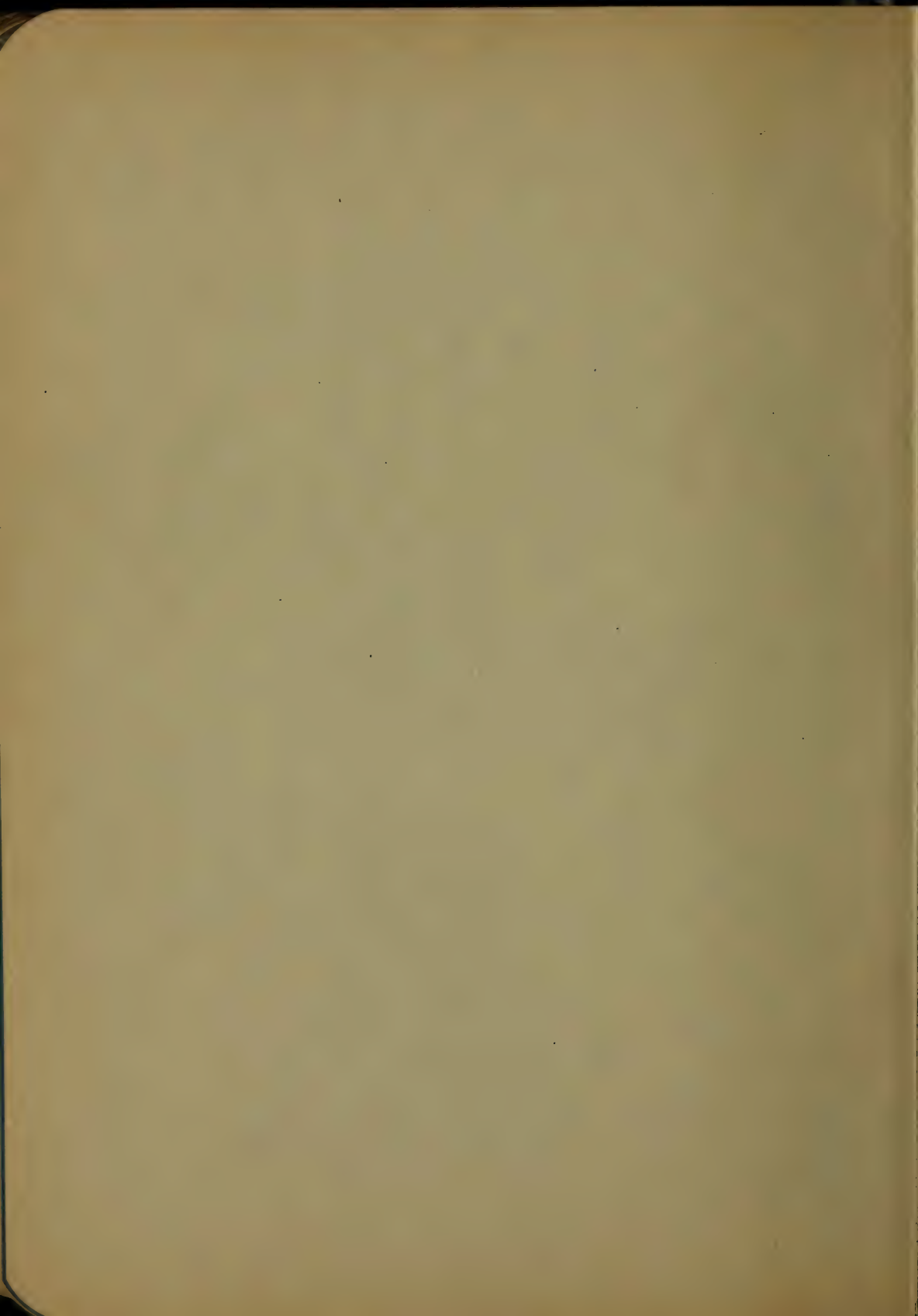
## ROLLER & BALLS.

HORSEPOWER	R.P.M.	D.	O	W	B
3	600	1 1/8	3	1 1/4	1/2
6	600	1 1/2	3 1/2	1 1/4	1/2
10	500	2	4	1 1/4	1/2
15	500	2 1/4	4 1/2	1 1/2	5/8
20	500	2 1/2	5	1 1/2	5/8
30	400	3	5 1/2	1 5/8	3/4
40	400	3 1/4	6	1 3/4	3/4
50	350	3 1/2	6 1/2	1 7/8	7/8
60	350	4	7 1/2	1 7/8	7/8
80	300	4 1/2	8	2 1/4	7/8
100	250	6	11	2 1/2	1
1000	130	14	26	3	1 1/4
2000	120	17	30	3	1 1/4

## VII ROLLER BEARINGS.

LOAD LBS. PER INCH LENGTH OF ROLLER.

IV BALLSHAFT BEARING.							D THCN.	B LM	R.P.M.	I	O	D	B	
D	O	C	W	IN	L	R.P.M.	1 1/2 to 1 1/8	1/4	44	400	1 1/2	1 3/4	9	1
1/4	1 1/8	3/8	3/8	3/16	8	800	1 3/8 - 1 1/8	5/16	56	375	2 1/8	2 3/16	10	1 1/8
3/8	1 1/8	3/4	3/8	3/16	12	700	2 - 2 1/8	3/8	98	350	2 3/4	3	11	1 1/4
1/2	1 1/2	1	1/2	1/4	16	600	3 - 3 3/8	1/2	154	325	4	4 1/4	12	1 1/4
5/8	1 5/8	1 1/8	1/2	1/4	20	560	4 - 4 1/2	5/8	225	300	5 1/4	5 1/2	SPEED	
3/4	2	1 3/8	5/8	5/16	24	400	5 - 5 1/4	3/4	300	275	6 1/2	6 3/4	190 to 170	
7/8	2 1/8	1 1/2	5/8	5/16	28	375	6 - 6 1/2	7/8	400	250	7 3/4	8 1/8	LOAD	
1	2 1/4	1 5/8	5/8	5/16	30	350	7 - 7 1/2	1	500	225	9	9 1/4	500 to 700	
							8 - 8 1/2	1	500	200	10	11		





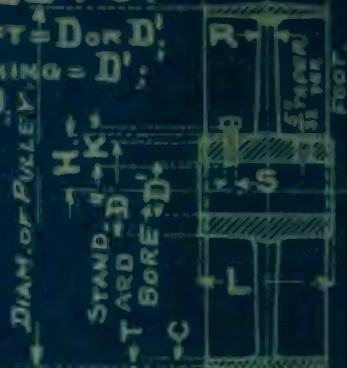


**SOLID  
AND  
SPLIT.**

# MACHINE MOULDED, TIGHT AND LOOSE. CAST IRON PULLEYS.



DIAMETER OF SHAFT =  $D$  OR  $D'$   
OUT. DIAM. OF BUSHING =  $D'$   
BORE OF BUSHING =  $D'$   
NUM. OF ARMS =  $N$   
DOUBLE ARMS  $W$   
BUSHINGS  
CAST IRON, BRASS.



ALL DIMENSIONS IN INCHES.

DIAM. OF PULLEY INCHES.	RIM.		HUB.						BORE.		ARMS.		
	FACE	T C	D	L	B	H	S	K	STAND- ARD	D	A	R	N <sup>o</sup>
6.6 1/2-7.7 1/2	3.4.5	1/8 3/16	2 5/8	3 1/2	1	1 9/16	1/2 x 3/4	1 5/8	1 5/8	1 5/8	1 5/8	5/16	
6.6 1/2-7.7 1/2	6.7.8.9	" "	2 15/16	4	"	"	1/2 x 3/8	"	"	"	"	"	
6.7.7 1/2	10.11.12	" "	3 3/16	5	"	"	1/2 x 3/8	2 3/16	1 3/16	1 1/8	"	3/8	
8.8 1/2-9.	3.4.5	1/8 3/16	3 3/4	3 1/2	1	1 3/8	1/2 x 3/8	2 3/16	1 3/16	1 1/8	3/8	3/8	4
8.8 1/2-9.	6.7.	" "	3 3/16	4 1/2	"	2	1/2 x 1	"	"	"	"	"	4
8.8 1/2-9.9 1/2	8.9.10	5/32 1/4	3 1/2	5	"	"	1/2 x 1	"	"	"	1	7/16	4
9.9 1/2	11.12.13.14	" "	3 3/4	6	"	"	1/2 x 1	2 11/16	1 3/16	1 1/8	"	"	4
10.11.12.13	3.4.5	5/32 1/4	3 3/4	3 3/4	1	2	1/2 x 1	2 5/8	1 3/16	1 1/8	1	1/2	4
10.11	6.7.	" "	"	4 1/2	"	"	1/2 x 1	"	"	"	"	"	4
10.12.13	8.9.	" "	3 3/8	5	"	"	1/2 x 1	"	"	"	1 1/8	5/16	4
10.11	10.11.12.13.14	" "	4 1/8	6	"	2 3/8	5/8 x 1 1/8	"	"	"	1 1/4	5/8	4
11.12.13.	6.7	" "	4 1/4	6	"	2 1/4	5/8 x 1 1/8	"	"	"	1 1/2	5/8	4
11.12.13.	8.9.10.	" "	"	6 1/2	1 1/8	"	5/8 x 1 1/8	"	"	"	1 3/4	5/8	4
12.13.	11.12.13.14	3/16 5/32	"	7	"	"	5/8 x 1 1/8	"	"	"	1 3/4	3/4	4
14.15.	3.4.5	5/32 1/4	4	4	1	2 1/4	1/2 x 3/8	2 5/8	1 3/16	1 1/8	1 1/8	1/2	6
14.15.	6.7.	" "	4 1/4	5	1 1/8	2 3/8	5/8 x 1	"	1 3/16	1 1/8	"	"	6
14.15	8.9.10.11	3/16 5/32	4 1/4	6	"	2 3/8	5/8 x 1	"	1 3/16	1 1/8	1 1/4	3/16	6
14.15	12.13.14	" "	4 1/2	7	"	2 3/8	5/8 x 1 1/8	"	1 1/8	1 1/8	1 3/4	5/8	6
16.17.	3.4.5	5/32 1/4	4 1/8	4	1	2 3/8	5/8 x 1	2 5/8	1 3/16	1 1/8	1 1/2	1 1/16	6
16.17.	6.7.	" "	4 1/4	5	1 1/8	2 1/2	5/8 x 1	"	1 3/16	1 1/8	1 3/4	3/4	6
16.17.	8.9.	3/16 5/32	4 3/8	6	"	2 1/2	5/8 x 1 1/8	"	1 3/16	1 1/8	"	"	6
16.17.	10.11.	" "	4 1/2	7	1 1/4	2 1/2	5/8 x 1 1/8	"	1 5/16	1 1/8	"	"	6
16.17	12.14.	7/32 5/16	4 3/4	7 1/2	"	2 5/8	3/4 x 1 1/8	3 3/16	2 1/8	2 1/8	1 3/8	3/8	6
16.17	15.16	" "	5	8 3/8	"	2 3/8	7/8 x 1 1/4	"	2 3/8	2 3/8	"	1	6
18.19	3.4.5.	3/16 5/32	4 1/8	4	1 1/8	2 3/8	5/8 x 1	2 5/8	1 3/16	1 1/8	1 3/8	5/8	6
18.19	6.7.	" "	4 1/4	5	"	2 3/8	5/8 x 1	"	1 3/16	1 1/8	1 3/8	5/8	6
18.19	8.9.10.12	7/32 5/16	4 1/2	6 1/2	"	2 1/2	3/4 x 1 1/8	"	1 1/8	1 1/8	1 1/2	1 1/16	6
18.19	14.16.18	" "	5	8 3/4	1 1/4	2 3/8	3/8 x 1 1/4	3 3/16	1 1/8	1 1/8	2 3/8	1	6
20.21.	3.4.5.	1/16 5/32	4 1/8	4	1	2 3/8	5/8 x 1	2 5/8	1 3/16	1 1/8	1 1/2	3/4	6
20.21	6.7.8.9	" "	4 1/4	5	1 1/8	2 1/2	3/4 x 1	"	1 3/16	1 1/8	1 1/2	"	6
20.21	10.11.12.14	7/32 5/16	4 3/8	6 1/2	"	2 5/8	3/4 x 1 1/8	"	"	"	"	"	6
20.21	16.18	9/32 1 1/32	5	8 1/2	1 1/4	2 3/8	7/8 x 1 1/4	3 3/16	1 3/16	1 1/8	2 1/8	3/8	6
20.21	20	5/16 3/8	5 1/4	10	"	3	7/8 x 1 1/4	"	1 3/16	1 1/8	2 1/4	1	6





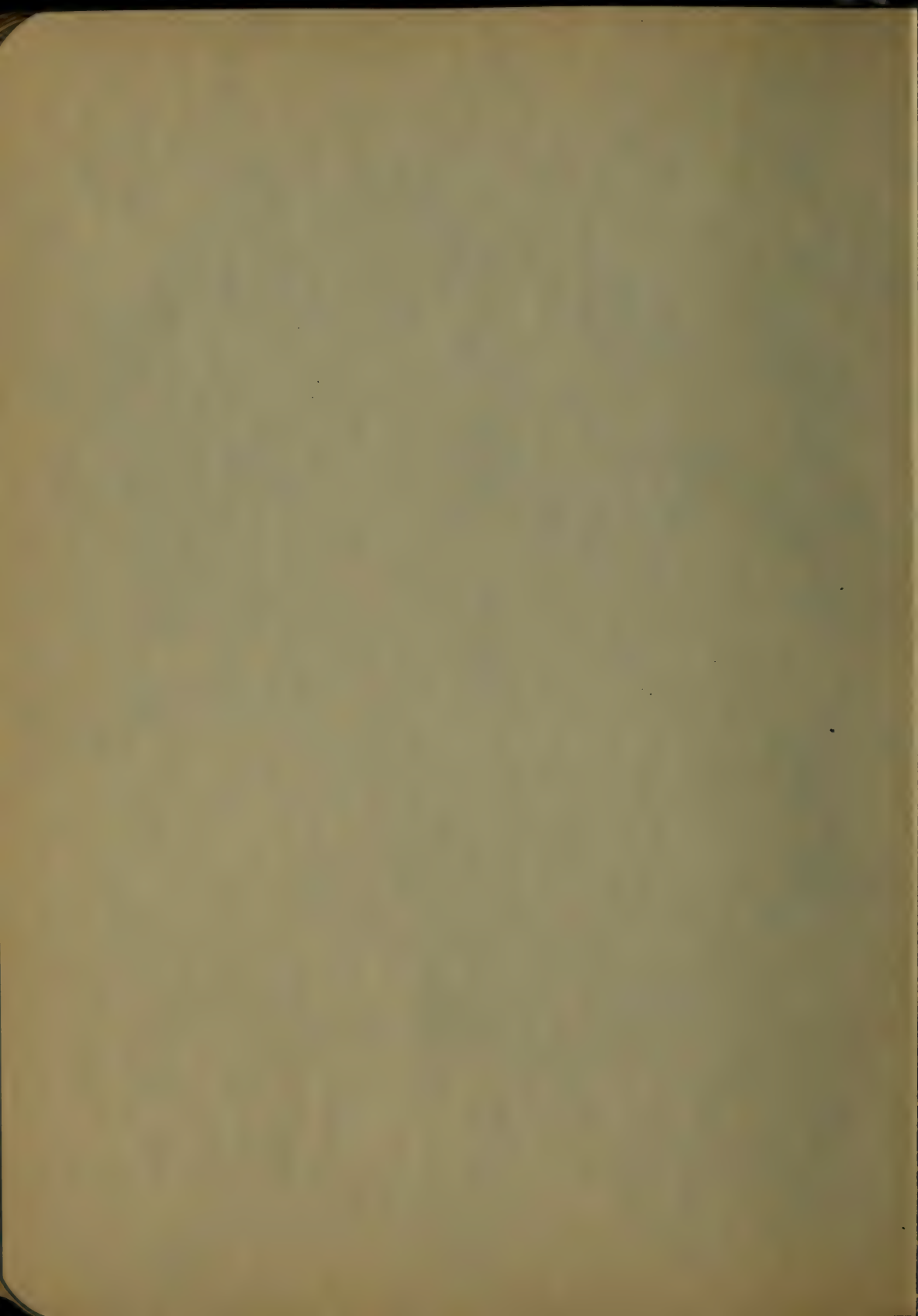
## MACHINE MOULDED CAST IRON PULLEYS.

DIAM. OF PULLEY. INCHES.	RIM.			HUB.					BORE.		ARMS			
	FACE.	T	C	D"	L	B	H	S×K	STAN- DARD	D	A	R	N	W
22.23	3.4.5.	$\frac{3}{16}$	$\frac{9}{32}$	4 $\frac{1}{4}$	4	1	2 $\frac{3}{8}$	$\frac{5}{8} \times 1$	2 $\frac{1}{2}$	1 $\frac{3}{16}$ to 2	1 $\frac{1}{2}$	$\frac{5}{8}$	6	•
22.23	6.7.8.9.	"	"	4 $\frac{1}{2}$	5	1 $\frac{1}{8}$	"	$\frac{3}{4} \times 1$	"	2 $\frac{3}{8}$ to 2 $\frac{1}{2}$	"	"	6	•
22.23	10.11	$\frac{7}{32}$	$\frac{4}{16}$	4 $\frac{3}{4}$	6	"	"	"	"	2 $\frac{5}{8}$ to 2 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{3}{4}$	6	•
22.23	12.14	"	"	5	7	1 $\frac{1}{4}$	2 $\frac{1}{2}$	$\frac{3}{4} \times 1\frac{1}{8}$	"	"	"	"	6	•
22.23	16.18	$\frac{9}{32}$	$\frac{1}{16}$	5 $\frac{1}{4}$	8 $\frac{1}{2}$	"	2 $\frac{3}{4}$	$\frac{7}{8} \times 1\frac{1}{4}$	3 $\frac{3}{16}$	1 $\frac{7}{8}$ to 2 $\frac{1}{16}$	2	"	6	•
22.23	20.22.24	$\frac{5}{16}$	$\frac{3}{16}$	5 $\frac{1}{2}$	11	"	3	"	"	"	2	"	6	•
24.25	3.4.5	$\frac{7}{32}$	$\frac{5}{16}$	5 $\frac{3}{8}$	4 $\frac{1}{4}$	1 $\frac{1}{8}$	2 $\frac{3}{8}$	$\frac{7}{8} \times 1\frac{1}{2}$	3 $\frac{3}{16}$	"	1 $\frac{1}{2}$	$\frac{3}{8}$	6	•
24.25	6.7.8.9.	"	"	5 $\frac{1}{4}$	5 $\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{3}{8}$	"	"	"	"	"	6	•
24.25	10.11.12.14	$\frac{1}{4}$	$\frac{3}{8}$	"	8	"	"	$\frac{7}{8} \times 1\frac{3}{4}$	"	1 $\frac{7}{8}$ to 2 $\frac{1}{16}$	1 $\frac{7}{8}$	$\frac{3}{4}$	6	•
24.25	16.18	"	"	5 $\frac{1}{2}$	9 $\frac{1}{2}$	1 $\frac{3}{8}$	3	"	"	"	2	"	6	•
24.25	20.22.24	$\frac{9}{32}$	"	5 $\frac{5}{8}$	10 $\frac{1}{2}$	"	3 $\frac{1}{4}$	"	"	"	2 $\frac{1}{8}$	$\frac{7}{8}$	6	•
24.25	26.28.30	$\frac{9}{32}$	$\frac{1}{16}$	5 $\frac{3}{4}$	12	1 $\frac{1}{2}$	3 $\frac{3}{8}$	DOUBLE.	"	"	2 $\frac{1}{4}$	"	6	•
26.27.28	3.4.5.6	$\frac{1}{4}$	$\frac{5}{16}$	5 $\frac{1}{8}$	4 $\frac{1}{4}$	1 $\frac{1}{8}$	2 $\frac{3}{4}$	$\frac{7}{8} \times 1\frac{1}{2}$	3 $\frac{3}{16}$	1 $\frac{1}{2}$ to 2 $\frac{1}{16}$	1 $\frac{1}{2}$	$\frac{5}{8}$	6	•
" 29."	7.8.9.10	"	"	5 $\frac{1}{4}$	5 $\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{3}{8}$	"	"	"	1 $\frac{3}{4}$	$\frac{1}{16}$	6	•
26.27.28	10.11.12.14	$\frac{9}{32}$	$\frac{1}{16}$	5 $\frac{1}{2}$	8	"	3	$\frac{7}{8} \times 1\frac{1}{4}$	"	"	1 $\frac{3}{4}$	$\frac{3}{4}$	6	•
" 29."	16.18.20	"	"	5 $\frac{3}{4}$	9 $\frac{1}{2}$	1 $\frac{3}{8}$	3 $\frac{3}{8}$	"	"	"	2 $\frac{1}{8}$	1	6	•
26.27.28	22.24.26	$\frac{5}{16}$	$\frac{7}{16}$	6	10 $\frac{1}{2}$	"	3 $\frac{3}{8}$	$\frac{7}{8} \times 2$	3 $\frac{1}{16}$	2 $\frac{1}{2}$ to 3	2 $\frac{1}{2}$	1 $\frac{1}{4}$	6	•
" 29."	28.30	"	"	6 $\frac{1}{4}$	12	1 $\frac{1}{2}$	3 $\frac{3}{4}$	DOUBLE.	"	2 $\frac{3}{4}$ to 3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$	6	•
30.31	3.4.5.6	$\frac{7}{32}$	$\frac{5}{16}$	5 $\frac{1}{8}$	4 $\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{7}{8} \times 1\frac{1}{2}$	3 $\frac{3}{16}$	"	1 $\frac{1}{2}$	$\frac{5}{8}$	6	•
30.31	6.7.8.9	"	"	5 $\frac{1}{4}$	6	"	3	"	"	"	1 $\frac{3}{4}$	$\frac{3}{4}$	6	•
30.31	8.9.10.11	$\frac{1}{4}$	$\frac{1}{16}$	5 $\frac{1}{2}$	7	1 $\frac{3}{8}$	3 $\frac{1}{2}$	$\frac{7}{8} \times 1\frac{1}{4}$	"	"	1 $\frac{7}{8}$	$\frac{7}{8}$	6	•
30.31	12.14	"	"	5 $\frac{3}{4}$	8	"	3 $\frac{1}{4}$	"	"	"	2	1	6	•
30.31	16.18	$\frac{9}{32}$	$\frac{7}{16}$	6	8 $\frac{1}{2}$	"	3 $\frac{1}{4}$	$\frac{7}{8} \times 2$	"	"	2 $\frac{1}{8}$	1	6	•
30.31	20.22	"	"	6 $\frac{1}{4}$	11 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{3}{8}$	DOUBLE.	"	"	2 $\frac{1}{4}$	1 $\frac{1}{8}$	6	•
30.31	24.26.28	$\frac{5}{16}$	"	6 $\frac{1}{2}$	13	"	3 $\frac{1}{2}$	$\frac{7}{8} \times 2$	3 $\frac{1}{16}$	1 $\frac{5}{8}$ to 2 $\frac{1}{16}$	2 $\frac{1}{2}$	1 $\frac{1}{8}$	6	•
30.31	28.30	$\frac{3}{8}$	$\frac{1}{2}$	6 $\frac{1}{2}$	14	"	3 $\frac{1}{2}$	DOUBLE.	"	"	2 $\frac{3}{4}$	1 $\frac{1}{4}$	6	•
32.33.34.	3.4.5.	$\frac{1}{8}$	$\frac{1}{16}$	5 $\frac{1}{4}$	4 $\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{7}{8} \times 1\frac{1}{2}$	3 $\frac{3}{16}$	"	1 $\frac{3}{4}$	$\frac{5}{8}$	6	•
35.36.	6.7.	"	"	5 $\frac{3}{8}$	5 $\frac{1}{4}$	"	3	"	"	"	1 $\frac{3}{4}$	$\frac{3}{4}$	6	•
32.33.34	8.9.	"	"	5 $\frac{1}{2}$	7	1 $\frac{3}{8}$	3 $\frac{3}{8}$	$\frac{7}{8} \times 1\frac{1}{4}$	"	"	1 $\frac{7}{8}$	$\frac{3}{4}$	6	•
35.36	10.11.	$\frac{5}{16}$	$\frac{7}{16}$	5 $\frac{3}{4}$	8 $\frac{1}{2}$	"	3 $\frac{3}{8}$	"	"	"	2	$\frac{7}{8}$	6	•
32.33.34	12.14.	"	"	6	11	"	3 $\frac{3}{8}$	"	"	"	2 $\frac{1}{8}$	1	6	•
35.36	16.18	"	"	6 $\frac{1}{4}$	12	1 $\frac{1}{2}$	3 $\frac{3}{8}$	$\frac{7}{8} \times 2$	"	"	2 $\frac{1}{4}$	1 $\frac{1}{16}$	6	•
32.33.34	20.22	$\frac{3}{8}$	$\frac{9}{16}$	6 $\frac{1}{4}$	13	"	3 $\frac{1}{2}$	DOUBLE.	"	"	2 $\frac{1}{4}$	1 $\frac{1}{8}$	6	•
35.36.	24.26	"	"	6 $\frac{1}{2}$	14	"	3 $\frac{1}{2}$	$\frac{7}{8} \times 2$	3 $\frac{1}{16}$	1 $\frac{5}{8}$ to 3 $\frac{1}{16}$	2 $\frac{1}{2}$	1 $\frac{1}{8}$	6	•
	28.30.32	"	"	6 $\frac{1}{2}$	15	1 $\frac{5}{8}$	3 $\frac{1}{2}$	1x2	"	2 $\frac{3}{8}$ to 3 $\frac{1}{8}$	2 $\frac{1}{2}$	1 $\frac{1}{4}$	6	•
36.	34.36	"	"	6 $\frac{3}{4}$	17	"	3 $\frac{5}{8}$	1x2 $\frac{1}{2}$	"	"	2 $\frac{3}{4}$	1 $\frac{1}{4}$	6	•
37.38.39	4.5.6	$\frac{1}{4}$	$\frac{1}{16}$	5 $\frac{1}{8}$	5 $\frac{1}{4}$	1 $\frac{3}{8}$	3	$\frac{7}{8} \times 1\frac{1}{2}$	3 $\frac{3}{16}$	1 $\frac{5}{8}$ to 2 $\frac{1}{16}$	1 $\frac{3}{4}$	$\frac{3}{4}$	6	•
40.41.42	7.8.9	"	"	5 $\frac{1}{4}$	7	"	3 $\frac{1}{8}$	"	"	"	1 $\frac{3}{4}$	$\frac{5}{8}$	6	•
37.38.39	10.11.12	$\frac{5}{16}$	$\frac{7}{16}$	6 $\frac{1}{4}$	8 $\frac{1}{2}$	"	3 $\frac{3}{8}$	$\frac{7}{8} \times 1\frac{1}{4}$	3 $\frac{1}{16}$	1 $\frac{5}{8}$ to 2 $\frac{1}{16}$	2	$\frac{15}{16}$	6	•
40.41.42	14.16.18	"	"	6 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$	$\frac{7}{8} \times 2$	"	"	2 $\frac{1}{8}$	1	6	•
37.38.39	20.22.24	$\frac{3}{8}$	$\frac{9}{16}$	6 $\frac{1}{2}$	14	"	3 $\frac{1}{2}$	"	"	"	2 $\frac{1}{4}$	1 $\frac{1}{8}$	6	•
40.41.42	26.28.30	"	"	8	16	"	4 $\frac{3}{8}$	"	3 $\frac{1}{16}$	2 $\frac{3}{8}$ to 3 $\frac{1}{8}$	2 $\frac{1}{2}$	1 $\frac{1}{8}$	6	•
37.38.39	32.34.36	"	"	8	18	1 $\frac{3}{4}$	4 $\frac{3}{8}$	"	"	"	2 $\frac{3}{4}$	1 $\frac{1}{4}$	6	•
40.41.42	38.40	$\frac{1}{16}$	$\frac{1}{16}$	8	20	"	4 $\frac{3}{8}$	1x2	"	"	3	1 $\frac{1}{4}$	6	•
44.46.48	4.5.6.	$\frac{1}{4}$	$\frac{1}{16}$	7 $\frac{3}{4}$	5 $\frac{1}{2}$	1 $\frac{3}{8}$	4 $\frac{1}{2}$	$\frac{7}{8} \times 1\frac{1}{2}$	3 $\frac{1}{16}$	"	1 $\frac{3}{4}$	$\frac{3}{4}$	6	•
44.46.48	7.8.9	"	"	7 $\frac{3}{4}$	7	"	4 $\frac{1}{8}$	$\frac{7}{8} \times 2$	"	"	2	$\frac{15}{16}$	6	•
44.46.48	10.11.12	$\frac{5}{16}$	$\frac{7}{16}$	7 $\frac{1}{4}$	8 $\frac{1}{2}$	"	4 $\frac{1}{8}$	1x2	"	"	2 $\frac{1}{8}$	1 $\frac{1}{16}$	6	•



## MACHINE MOULDED CAST IRON PULLEYS.

DIAM. OF PULLEY INCHES	RIM.			HUB.					BORE.		ARMS.			
	FACE	T	C	D <sup>N</sup>	L	B	H	S×K	D <sup>I</sup>	D	A	R	N <sup>W</sup>	
44.46.48	14.14.18	$\frac{5}{16}$	$\frac{3}{16}$	$7\frac{3}{4}$	13	$1\frac{1}{2}$	$4\frac{3}{8}$	$1\frac{1}{2} \times 2\frac{1}{4}$ "	$3\frac{15}{16}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$	6	DOUBLE.
44.46.48	20.22.24	$\frac{3}{8}$	$\frac{3}{16}$	8	15	"	$4\frac{3}{8}$	"	"	$2\frac{3}{8}$	$2\frac{1}{2}$	$1\frac{3}{16}$	6	
44.46.48	26.28.30	"	"	8	17	"	$4\frac{1}{2}$	"	"	$2\frac{3}{8}$	$2\frac{1}{2}$	$1\frac{1}{4}$	6	
44.46.48	32.34.36	$\frac{7}{16}$	$\frac{5}{8}$	8	20	$1\frac{1}{2}$	$4\frac{1}{2}$	"	"	$2\frac{3}{8}$	3	$1\frac{5}{16}$	6	
44.46.48	38.40	"	"	8	22	"	$4\frac{1}{2}$	"	"	$2\frac{3}{8}$	$3\frac{1}{8}$	$1\frac{5}{16}$	6	
50.52.54	5.6.7.8	$\frac{5}{16}$	$\frac{3}{16}$	8	$6\frac{1}{2}$	$1\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{3}{8} \times 2$	$3\frac{15}{16}$	$2\frac{3}{8}$	2	1	6	DOUBLE.
56.58	9.10.11	"	"	8	$8\frac{1}{2}$	"	"	"	"	$2\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$	6	
"	12.14.16	$\frac{3}{8}$	$\frac{3}{16}$	8	10	$1\frac{1}{4}$	"	"	"	$2\frac{3}{8}$	$2\frac{1}{4}$	$1\frac{3}{16}$	6	
"	18.20.22	"	"	8	14	"	"	"	"	$2\frac{3}{8}$	$2\frac{1}{2}$	$1\frac{1}{4}$	6	
"	24.26.28	$\frac{7}{16}$	$\frac{5}{8}$	$8\frac{3}{4}$	16	2	$4\frac{3}{4}$	"	$4\frac{7}{16}$	$2\frac{3}{8}$	$2\frac{3}{8}$	$1\frac{5}{16}$	6	
"	30.32.34	"	$\frac{5}{8}$	$8\frac{3}{4}$	18	"	"	"	"	3	$3\frac{1}{8}$	$1\frac{5}{16}$	6	
"	36.38.40.42	"	"	$8\frac{3}{4}$	20	"	"	"	"	$2\frac{3}{8}$	$3\frac{1}{8}$	$1\frac{3}{8}$	6	
"	44.46	$\frac{1}{2}$	$\frac{1}{16}$	$8\frac{3}{4}$	23	"	"	"	"	$2\frac{3}{8}$	$3\frac{1}{4}$	$1\frac{3}{16}$	6	
60.62.64.	6.7.8.9	$\frac{5}{16}$	$\frac{3}{16}$	$8\frac{1}{2}$	8	$1\frac{1}{2}$	$4\frac{5}{8}$	$\frac{7}{8} \times 2$	$4\frac{7}{16}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$	8	DOUBLE.
66.68.70	10.11.12	"	"	$8\frac{1}{2}$	10	"	$4\frac{5}{8}$	"	"	$2\frac{3}{8}$	$2\frac{1}{4}$	$1\frac{1}{4}$	8	
72.	14.16.18	$\frac{3}{8}$	$\frac{3}{16}$	$8\frac{1}{2}$	14	"	$4\frac{5}{8}$	"	"	$2\frac{3}{8}$	$2\frac{1}{2}$	$1\frac{1}{4}$	8	
"	20.22.24	"	"	$8\frac{3}{8}$	16	$1\frac{3}{4}$	$4\frac{3}{4}$	"	"	$2\frac{3}{8}$	$2\frac{3}{8}$	$1\frac{3}{8}$	8	
"	26.28.30	$\frac{7}{16}$	$\frac{5}{8}$	$8\frac{7}{8}$	18	"	$4\frac{3}{8}$	"	"	3	$3\frac{1}{8}$	$1\frac{3}{8}$	8	
"	32.34.36	"	"	$8\frac{7}{8}$	20	$2\frac{1}{4}$	$4\frac{1}{4}$	"	"	$3\frac{1}{8}$	$3\frac{1}{8}$	$1\frac{3}{16}$	8	
"	38.40.42	"	"	9	22	"	$4\frac{3}{8}$	"	"	$3\frac{1}{4}$	$3\frac{1}{4}$	$1\frac{1}{2}$	8	
"	44.46.48	$\frac{1}{2}$	$\frac{1}{16}$	9	23	"	$4\frac{3}{8}$	"	"	$3\frac{3}{8}$	$3\frac{3}{8}$	$1\frac{1}{2}$	8	
"	50.52.	"	"	9	24	"	$4\frac{3}{8}$	"	"	$3\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{5}{8}$	8	
74.76.78	8.9.10	$\frac{3}{8}$	$\frac{3}{16}$	$9\frac{3}{4}$	8	2	$4\frac{7}{8}$	$1 \times 2\frac{1}{4}$	$4\frac{15}{16}$	$2\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{4}$	8	DOUBLE.
80.82.84	11.12.14	"	"	$9\frac{3}{4}$	10	$2\frac{1}{4}$	5	"	"	$2\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{1}{4}$	8	
86.88.90	16.18.20	"	"	10	14	$2\frac{3}{8}$	$5\frac{1}{4}$	"	"	3	3	$1\frac{3}{8}$	12	
92.94.	22.24.26	$\frac{7}{16}$	$\frac{5}{8}$	10	16	"	"	"	"	$3\frac{1}{4}$	$3\frac{1}{4}$	$1\frac{1}{4}$	12	
"	28.30.32	"	"	$10\frac{1}{2}$	18	"	$5\frac{1}{2}$	"	"	$3\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{2}$	8	
"	34.36.38	$\frac{1}{2}$	$\frac{1}{16}$	$10\frac{1}{2}$	20	"	$5\frac{1}{2}$	"	"	$3\frac{3}{4}$	$3\frac{3}{4}$	$1\frac{3}{4}$	8	
"	40.42.44	"	"	$10\frac{3}{8}$	22	"	$5\frac{3}{4}$	$1\frac{1}{4} \times 2\frac{1}{2}$ "	$5\frac{7}{16}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$1\frac{3}{8}$	8	
"	46.48.50	$\frac{3}{16}$	$\frac{3}{4}$	$10\frac{3}{8}$	23	$2\frac{1}{2}$	$5\frac{3}{4}$	"	"	4	4	2	8	
"	52.54.56	$\frac{5}{8}$	$\frac{7}{8}$	$11\frac{1}{4}$	24	"	6	"	"	$4\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{1}{2}$	8	
96.98.100	8.9.10	$\frac{3}{8}$	$\frac{3}{16}$	$10\frac{3}{8}$	8	$2\frac{1}{4}$	$6\frac{1}{4}$	$1\frac{1}{8} \times 2\frac{1}{2}$	$5\frac{7}{16}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{3}{8}$	8	DOUBLE.
102.104	11.12.14	"	"	$10\frac{3}{8}$	10	"	$5\frac{3}{4}$	"	"	3	3	$1\frac{1}{2}$	12	
106.108	16.18.20	$\frac{7}{16}$	$\frac{5}{8}$	$11\frac{1}{4}$	14	"	6	"	"	$3\frac{1}{4}$	$3\frac{1}{4}$	$1\frac{3}{4}$	12	
110.112	22.24.26	"	"	$11\frac{1}{8}$	16	$2\frac{3}{8}$	6	"	"	$3\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{5}{8}$	12	
114.116	28.30.32	$\frac{1}{2}$	$\frac{1}{16}$	$11\frac{1}{8}$	18	"	6	"	"	$3\frac{3}{4}$	$3\frac{3}{4}$	$1\frac{7}{8}$	12	
"	34.36.38	"	"	$11\frac{1}{8}$	20	"	6	"	"	4	4	2	12	
"	40.42.44	$\frac{3}{16}$	$\frac{3}{4}$	$11\frac{1}{8}$	22	$2\frac{1}{2}$	$6\frac{1}{4}$	$1\frac{1}{2} \times 3$	$5\frac{7}{16}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{1}{2}$	12	
"	46.48.50	"	"	$11\frac{1}{8}$	23	"	$6\frac{1}{4}$	"	"	$4\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{1}{2}$	12	
"	52.54.56	$\frac{5}{8}$	$\frac{7}{8}$	12	24	"	$6\frac{1}{2}$	"	"	$4\frac{3}{4}$	$4\frac{3}{4}$	$2\frac{1}{2}$	12	
"	58.60	"	"	12	26	"	$6\frac{1}{2}$	"	"	$4\frac{3}{4}$	$4\frac{3}{4}$	$2\frac{5}{8}$	12	
118.120	12.14.16	$\frac{7}{16}$	$\frac{5}{8}$	$12\frac{1}{4}$	$10\frac{1}{2}$	$2\frac{3}{8}$	$6\frac{1}{2}$	$1\frac{1}{8} \times 2\frac{1}{4}$	$5\frac{15}{16}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{2}$	12	DOUBLE.
122.124	18.20.22.24	"	"	$12\frac{1}{4}$	15	"	$6\frac{1}{2}$	"	"	$3\frac{3}{4}$	$3\frac{3}{4}$	$1\frac{3}{4}$	12	
126.128	26.28.30.32	$\frac{1}{2}$	$\frac{1}{16}$	$12\frac{1}{4}$	$18\frac{1}{2}$	$2\frac{1}{2}$	$6\frac{5}{8}$	"	"	4	4	$2\frac{1}{8}$	12	
130.132.	34.36.38.40	"	"	$12\frac{1}{4}$	21	"	$6\frac{5}{8}$	"	"	$4\frac{3}{8}$	$4\frac{3}{8}$	$2\frac{1}{4}$	12	
134.136.138	42.44.46.48	$\frac{5}{8}$	$\frac{7}{8}$	$12\frac{1}{4}$	$24\frac{1}{2}$	"	$6\frac{3}{4}$	"	"	$4\frac{3}{4}$	$4\frac{3}{4}$	$2\frac{1}{2}$	12	
140.142.144	50.52.54.56	"	"	$13\frac{1}{4}$	27	$2\frac{3}{4}$	7	"	$6\frac{15}{16}$	$4\frac{15}{16}$	$4\frac{15}{16}$	$2\frac{3}{4}$	12	
"	58.60.62.64	$\frac{3}{4}$	1	14	$30\frac{1}{2}$	"	$7\frac{1}{4}$	"	"	$5\frac{15}{16}$	$5\frac{15}{16}$	3	12	





# ALL-WROUGHT STEEL SPLIT PULLEYS.

TIGHT AND LOOSE.

AMERICAN PULLEY CO.  
PHILADELPHIA PA.

DIAMETER OF PULLEYS.	STANDARD BORE	SHAFT OR BUSHING.	LENGTH OF HUB.			FACE OF PULLEYS.						WEIGHT.	
			2	3	4	5	6	8	10	12	14	16	
6	1 15/16"	1 1/16" TO 1 3/16"	HUB 3 1/2"			HUB 4 1/2"		INCHES					
			6	7	7	8	8	LBS.					
7	2 3/16	1 3/16 TO 1 5/16	HUB 3 1/2"			HUB 4 1/2"		HUB INCHES.					
			7	7	8	9	10	WEIGHT OF PULLEY, LBS.					
8	2 3/8 & 2 15/16	1 3/8 " TO 2 3/8	3 1/2 LENGTH OF HUB			HUB 4 1/2		4 1/2					
			8	11	12	14	15	16	19				
9	2 3/8 & 2 15/16	1 3/8 TO 2 3/8	3 1/2 & 4 1/2			4 1/2		4 1/2					
			11	12	13	14	16	17	20				
10	2 3/8 & 2 15/16	1 3/8 TO 2 3/8	3 1/2 & 4 1/2			HUB 5 1/2							
			12	14	17	20	21	23	29	34			
11	2 3/8 & 2 15/16	1 3/8 TO 2 3/8	3 1/2 & 4 1/2			HUB 5 1/2							
			12	17	18	22	24	23	32	36			
12	2 5/8 & 2 3/4	1 3/8 " 2 3/8	3 1/2 & 4 1/2			HUB 5 1/2							
			14	18	19	24	24	26	34	36			
13	2 3/8 & 2 3/4	1 3/8 " 2 11/16	3 1/2 & 4 1/2			HUB 5 1/2 INCHES.							
			15	18	19	24	25	27	37	38	LBS.		
14	2 3/8 & 2 3/4	1 3/8 " 2 11/16	3 1/2 & 4 1/2			HUB 5 1/2							
			15	19	20	26	26	28	38	41			
15	2 3/8 & 2 3/4	1 3/8 " 2 11/16	3 1/2 & 4 1/2			HUB 5 1/2							
			16	20	22	27	28	31	41	43			
16	2 3/8 & 2 3/4	1 3/8 " 2 11/16	3 1/2 & 4 1/2			HUB 5 1/2							
			18	21	23	28	28	33	43	46			
17	2 3/8 & 2 3/4	1 3/8 " 2 11/16	4 1/2			HUB 5 1/2							
			21	24	29	30	35	46	48				
18	3 3/16	1 7/16 " 2 11/16	4 1/2			HUB 5 1/2							
			23	25	30	32	37	47	50				
19	2 15/16 TO 3 3/16	1 7/16 " 2 11/16	4 1/2			HUB 5 1/2							
			25	25	31	33	38	48	51				
20	2 15/16 TO 3 3/16	1 7/16 " 2 11/16	4 1/2			HUB 5 1/2 INCHES.							
			25	26	31	35	39	50	54				
21	2 15/16 TO 3 3/16	1 7/16 " 2 11/16	4 1/2			HUB 5 1/2							
			25	26	32	36	41	52	55				
22	2 15/16 TO 3 3/16	1 7/16 " 2 11/16	4 1/2			HUB 5 1/2							
			26	28	34	39	45	54	58				
23	2 15/16 TO 3 3/16	1 7/16 " 2 11/16	4 1/2			HUB 5 1/2							
			31	32	38	41	48	56	59				
24	2 15/16 TO 3 3/16	1 11/16 " 2 11/16				HUB 5 1/2 INCHES.							
			32	34	38	55	67	70	73				
26	3 3/16	1 11/16 " 2 11/16				HUB 5 1/2 & 6 1/2 INCHES.							
			48			57	69	81					
28	3 3/16	1 11/16 " 2 11/16				HUB 5 1/2 & 6 1/2 INCHES.							
			50			58	71	108	114	129	136		
30	3 3/16 TO 4 3/16	1 15/16 " 3 3/16				HUB 5 1/2 & 6 1/2 INCHES.							
			52			89	103	114	120	137	144		
32	3 3/16 TO 4 3/16	1 15/16 " 3 3/16				HUB 6 1/2 INCHES.							
			92			102	112	125	143	152	160		
34	3 3/16 TO 4 3/16	1 15/16 " 3 3/16				HUB 6 1/2 INCHES.							
			96			106	117	130	150	159	168		
36	3 3/8 TO 4 3/8	2 3/16 " 3 3/16				HUB 6 1/2 INCHES.							
			100			110	121	136	156	166	175		
38	3 3/8 TO 4 3/8	2 3/16 " 3 3/16				HUB 6 1/2 INCHES.							
			104			115	126	142	163	173	183		
40	3 3/8 TO 4 3/8	2 3/16 " 3 3/16				HUB 6 1/2 INCHES.							
			108			119	131	147	170	181	191		
42	3 3/8 TO 4 3/8	2 7/16 " 3 3/16				HUB 6 1/2 INCHES.							
			112			123	136	153	176	188	200		







# HORSE POWER OF LEATHER BELTS AND PULLEYS.

PRACTICAL BELT SPEEDS 400, 600, 800, 1000, 1200, 1500, 2000, 2500, 3000, 3500 & 4000 FEET/MIN.  
 BELT CONTACT ON SMALL PULLEY 90°. 112½°. 120°. 135°. 150°. 157½°. 180°. 225°. 270°.

RATIO

.45 .58 .63 .72 .81 .86 1.0 1.10 1.25

DIAMETER OF SHAFT, INCH.	15/ 16	1 3/ 16	1 7/ 16	1 11/ 16	1 15/ 16	2 1/ 16	2 1/ 8	2 1/ 4	2 3/ 8	2 1/ 2	3 1/ 8	3 1/ 4	3 3/ 8	3 1/ 2	3 5/ 8	4 1/ 8	4 3/ 8	5 1/ 8
ACTUAL H.P. PER REVOLUTION	.012	.024	.042	.067	.100	.143	.195	.26	.338	.425	.535	.66	.80	1.11	1.56	2.09	2.72	

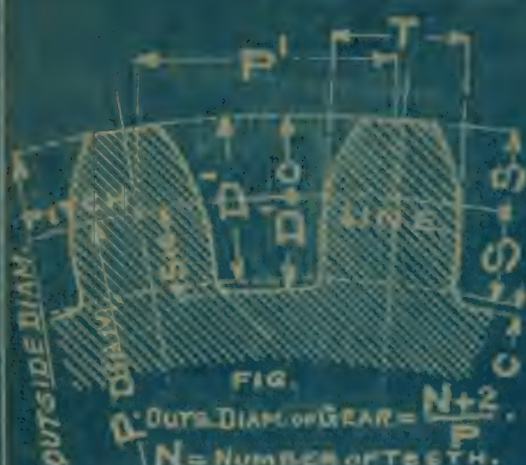
WIDTH OF BELT, IN. SINGLE DOUBLE

12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	330	336	342	348	354	360	366	372	378	384	390	396	402	408	414	420	426	432	438	444	450	456	462	468	474	480	486	492	498	504	510	516	522	528	534	540	546	552	558	564	570	576	582	588	594	600	606	612	618	624	630	636	642	648	654	660	666	672	678	684	690	696	702	708	714	720	726	732	738	744	750	756	762	768	774	780	786	792	798	804	810	816	822	828	834	840	846	852	858	864	870	876	882	888	894	900	906	912	918	924	930	936	942	948	954	960	966	972	978	984	990	996	1002	1008	1014	1020	1026	1032	1038	1044	1050	1056	1062	1068	1074	1080	1086	1092	1098	1104	1110	1116	1122	1128	1134	1140	1146	1152	1158	1164	1170	1176	1182	1188	1194	1200	1206	1212	1218	1224	1230	1236	1242	1248	1254	1260	1266	1272	1278	1284	1290	1296	1302	1308	1314	1320	1326	1332	1338	1344	1350	1356	1362	1368	1374	1380	1386	1392	1398	1404	1410	1416	1422	1428	1434	1440	1446	1452	1458	1464	1470	1476	1482	1488	1494	1500	1506	1512	1518	1524	1530	1536	1542	1548	1554	1560	1566	1572	1578	1584	1590	1596	1602	1608	1614	1620	1626	1632	1638	1644	1650	1656	1662	1668	1674	1680	1686	1692	1698	1704	1710	1716	1722	1728	1734	1740	1746	1752	1758	1764	1770	1776	1782	1788	1794	1800	1806	1812	1818	1824	1830	1836	1842	1848	1854	1860	1866	1872	1878	1884	1890	1896	1902	1908	1914	1920	1926	1932	1938	1944	1950	1956	1962	1968	1974	1980	1986	1992	1998	2004	2010	2016	2022	2028	2034	2040	2046	2052	2058	2064	2070	2076	2082	2088	2094	2100	2106	2112	2118	2124	2130	2136	2142	2148	2154	2160	2166	2172	2178	2184	2190	2196	2202	2208	2214	2220	2226	2232	2238	2244	2250	2256	2262	2268	2274	2280	2286	2292	2298	2304	2310	2316	2322	2328	2334	2340	2346	2352	2358	2364	2370	2376	2382	2388	2394	2400	2406	2412	2418	2424	2430	2436	2442	2448	2454	2460	2466	2472	2478	2484	2490	2496	2502	2508	2514	2520	2526	2532	2538	2544	2550	2556	2562	2568	2574	2580	2586	2592	2598	2604	2610	2616	2622	2628	2634	2640	2646	2652	2658	2664	2670	2676	2682	2688	2694	2700	2706	2712	2718	2724	2730	2736	2742	2748	2754	2760	2766	2772	2778	2784	2790	2796	2802	2808	2814	2820	2826	2832	2838	2844	2850	2856	2862	2868	2874	2880	2886	2892	2898	2904	2910	2916	2922	2928	2934	2940	2946	2952	2958	2964	2970	2976	2982	2988	2994	3000	3006	3012	3018	3024	3030	3036	3042	3048	3054	3060	3066	3072	3078	3084	3090	3096	3102	3108	3114	3120	3126	3132	3138	3144	3150	3156	3162	3168	3174	3180	3186	3192	3198	3204	3210	3216	3222	3228	3234	3240	3246	3252	3258	3264	3270	3276	3282	3288	3294	3300	3306	3312	3318	3324	3330	3336	3342	3348	3354	3360	3366	3372	3378	3384	3390	3396	3402	3408	3414	3420	3426	3432	3438	3444	3450	3456	3462	3468	3474	3480	3486	3492	3498	3504	3510	3516	3522	3528	3534	3540	3546	3552	3558	3564	3570	3576	3582	3588	3594	3600	3606	3612	3618	3624	3630	3636	3642	3648	3654	3660	3666	3672	3678	3684	3690	3696	3702	3708	3714	3720	3726	3732	3738	3744	3750	3756	3762	3768	3774	3780	3786	3792	3798	3804	3810	3816	3822	3828	3834	3840	3846	3852	3858	3864	3870	3876	3882	3888	3894	3900	3906	3912	3918	3924	3930	3936	3942	3948	3954	3960	3966	3972	3978	3984	3990	3996	4002	4008	4014	4020	4026	4032	4038	4044	4050	4056	4062	4068	4074	4080	4086	4092	4098	4104	4110	4116	4122	4128	4134	4140	4146	4152	4158	4164	4170	4176	4182	4188	4194	4200	4206	4212	4218	4224	4230	4236	4242	4248	4254	4260	4266	4272	4278	4284	4290	4296	4302	4308	4314	4320	4326	4332	4338	4344	4350	4356	4362	4368	4374	4380	4386	4392	4398	4404	4410	4416	4422	4428	4434	4440	4446	4452	4458	4464	4470	4476	4482	4488	4494	4500	4506	4512	4518	4524	4530	4536	4542	4548	4554	4560	4566	4572	4578	4584	4590	4596	4602	4608	4614	4620	4626	4632	4638	4644	4650	4656	4662	4668	4674	4680	4686	4692	4698	4704	4710	4716	4722	4728	4734	4740	4746	4752	4758	4764	4770	4776	4782	4788	4794	4800	4806	4812	4818	4824	4830	4836	4842	4848	4854	4860	4866	4872	4878	4884	4890	4896	4902	4908	4914	4920	4926	4932	4938	4944	4950	4956	4962	4968	4974	4980	4986	4992	4998	5004	5010	5016	5022	5028	5034	5040	5046	5052	5058	5064	5070	5076	5082	5088	5094	5100	5106	5112	5118	5124	5130	5136	5142	5148	5154	5160	5166	5172	5178	5184	5190	5196	5202	5208	5214	5220	5226	5232	5238	5244	5250	5256	5262	5268	5274	5280	5286	5292	5298	5304	5310	5316	5322	5328	5334	5340	5346	5352	5358	5364	5370	5376	5382	5388	5394	5400	5406	5412	5418	5424	5430	5436	5442	5448	5454	5460	5466	5472	5478	5484	5490	5496	5502	5508	5514	5520	5526	5532	5538	5544	5550	5556	5562	5568	5574	5580	5586	5592	5598	5604	5610	5616	5622	5628	5634	5640	5646	5652	5658	5664	5670	5676	5682	5688	5694	5700	5706	5712	5718	5724	5730	5736	5742	5748	5754	5760	5766	5772	5778	5784	5790	5796	5802	5808	5814	5820	5826	5832	5838	5844	5850	5856	5862	5868	5874	5880	5886	5892	5898	5904	5910	5916	5922	5928	5934	5940	5946	5952	5958	5964	5970	5976	5982	5988	5994	6000	6006	6012	6018	6024	6030	6036	6042	6048	6054	6060	6066	6072	6078	6084	6090	6096	6102	6108	6114	6120	6126	6132	6138	6144	6150	6156	6162	6168	6174	6180	6186	6192	6198	6204	6210	6216	6222	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## GEAR WHEELS.



$$P = \frac{\text{DIAMETRAL PITCH} \times \text{NUMBER OF TEETH}}{\text{PITCH DIAMETER}}$$

CIRCULAR PITCH =  $\frac{3.1416}{\text{DIAMETRAL PITCH}}$  INCH

$$T = \text{THICKNESS (PT) OF TH} = \frac{1.57}{\text{DIAM PITCH}} = 0.0018$$

$$C = \text{CLEARANCE} = \frac{T}{10} \text{ INCHES.}$$

$$D+C = \text{WHOLE} \quad \therefore \quad D = \frac{2.157}{2}$$

S = ADDENDUM =  $\frac{1}{P}$  INCHES

$$S = C \cdot \text{DEPTH OF TOOTH BELOW FLANK} = \frac{1.157}{P} \text{ INCHES.}$$

# INVOLUTE AND EPICYCLOIDAL CUTTERS.



P	DIAMETER OF CUTTER.	HOLE IN CUTTER.	P	DIAMETER OF CUTTER.	HOLE IN CUTTER.
1 1/4	7 3/8"	1 1/2"	6	2 3/4"	1 1/16"
1 1/2	6 1/2"	1 3/8"	7	2 7/16"	1 1/16"
1 3/4	5 3/4"	1 1/2"	8	2 1/2"	1 1/16"
2	5"	1 3/4"	9	2 3/8"	1 1/16"
2 1/4	4 1/2"	1 1/4"	10	2 1/8"	3/8"
2 1/2	4 1/4"	1 1/4"	11	2 1/4"	3/8"
2 3/4	4"	1 3/8"	12 to 15	2"	3/8"
3	3 13/16"	1 1/4"	16 to 18	1 15/16"	3/8"
3 1/2	3 3/16"	1 1/4"	20	1 3/4"	3/8"
4	3 3/8"	1 1/4"	22	1 3/8"	3/8"
5	3 1/4"	1 1/2"	24 to 48	1 3/16"	3/8"

ALL GEARS OF SAME PITCH CUT WITH ABOVE CUTTERS ARE INTER-CHANGEABLE.

### INVOLUTE CUTTERS.

8 CUTTERS ARE MADE FOR EACH PITCH

MANUFACTURER	NO.	CUR WHEELS FROM	35 TESTS FOR RACK
INDEL.	2	"	55
	3	"	35
	4	"	26
	5	"	21
	6	"	17
	7	"	14
	8	"	12

## EPICYCLOIDAL CUTTERS

24 CUTTERS PER EACH PITCH.

N <sup>o</sup> A	CUTS	12 TEETH	N <sup>o</sup> M	CUTS	27-29 V
B	"	13 "	N	"	30-33 "
C	"	14 "	O	"	34-37 "
D	"	15 "	P	"	38-42 "
E	"	16 "	Q	"	43-49 "
F	"	17 "	R	"	50-59 "
G	"	18 "	S	"	60-74 "
H	"	19 "	T	"	75-90 "
I	"	20 "	U	"	100-149 "
J	"	21-22 "	V	"	150-249 "
K	"	23-24 "	W	"	250-499 "
L	"	25-26 "	X	"	RACH.

LETTERS INDICATE MFG. INDEX.

**SPECIAL CUTTERS ARE MADE**  
FOR 2 TO 8 FITTINGS.

N $\frac{1}{2}$ cut 20 to 34.	5 $\frac{1}{2}$ cut 19 to 20.
2 $\frac{1}{2}$ " 42 " 54.	6 $\frac{1}{2}$ " 15 " 16.
3 $\frac{1}{2}$ " 30 " 34.	7 $\frac{1}{2}$ " 13 TEETH.
4 $\frac{1}{2}$ " 23 " 28.	



# DIMENSIONS OF CUT GEAR TOOTH PARTS.

## DIAMETRAL PITCH. P.

P	P'	D+c	D'	T	S+c	S+c <sup>1</sup> / <sub>2</sub>	c
1/4	12.5628	5.6283	8.0000	6.2832	4.6283	4.0000	.6283
1/2	6.2855	4.3142	4.0000	3.1416	2.3142	2.0000	.3142
3/4	4.189	2.8761	2.6666	2.0444	1.5422	1.3333	.2093
1	3.142	2.1571	2.0000	1.5708	1.1571	1.0000	.1571
1 1/4	2.513	1.7257	1.6000	1.2566	.9257	.8000	.1257
1 1/2	2.094	1.4381	1.3333	1.0472	.7714	.6666	.1043
1 3/4	1.794	1.2326	1.1429	.8976	.6612	.5714	.0898
2	1.571	1.0735	1.0000	.7854	.5735	.5000	.0735
2 1/4	1.396	.9327	.8888	.6881	.5143	.4444	.0689
2 1/2	1.257	.8028	.8000	.6283	.4628	.4000	.0628
2 3/4	1.142	.7844	.7273	.5712	.4203	.3636	.0572
3	1.047	.7170	.6666	.5236	.3807	.3333	.0524
3 1/2	.898	.6163	.5714	.4488	.3306	.2857	.0449
4	.785	.5393	.5000	.3927	.2893	.2500	.0393
5	.628	.4314	.4000	.3142	.2314	.2000	.0314
6	.524	.3595	.3533	.2618	.1928	.1666	.0262
7	.449	.3081	.2857	.2244	.1653	.1429	.0224
8	.393	.2696	.2500	.1963	.1446	.1250	.0196
9	.349	.2397	.2222	.1745	.1286	.1111	.0175
10	.314	.2157	.2000	.1571	.1157	.1000	.0157
11	.286	.1961	.1818	.1428	.1052	.0909	.0143
12	.262	.1798	.1666	.1309	.0964	.0833	.0131
13	.241	.1659	.1538	.1208	.0890	.0769	.0121
14	.224	.1541	.1429	.1122	.0826	.0714	.0112
15	.209	.1438	.1333	.1047	.0771	.0666	.0105
16	.196	.1348	.1250	.0982	.0723	.0628	.0098
17	.184	.1269	.1176	.0924	.0681	.0588	.0093
18	.175	.1198	.1111	.0873	.0643	.0555	.0088
19	.165	.1135	.1053	.0827	.0609	.0526	.0083
20	.157	.1079	.1000	.0785	.0579	.0500	.0079
21	.149	.1026	.0952	.0748	.0550	.0476	.0074
22	.143	.0980	.0909	.0714	.0526	.0454	.0072
23	.137	.0936	.0868	.0683	.0502	.0434	.0068
24	.131	.0898	.0833	.0654	.0482	.0417	.0065
25	.125	.0863	.0800	.0628	.0463	.0400	.0063
26	.121	.0829	.0769	.0604	.0445	.0385	.0060
27	.116	.0798	.0740	.0581	.0428	.0370	.0058
28	.112	.0770	.0714	.0561	.0413	.0357	.0056
29	.108	.0742	.0688	.0541	.0398	.0344	.0054
30	.105	.0719	.0666	.0526	.0386	.0333	.0053
31	.101	.0695	.0644	.0506	.0372	.0322	.0052
32	.098	.0674	.0625	.0491	.0362	.0312	.0050
33	.095	.0653	.0606	.0476	.0350	.0303	.0048
34	.092	.0634	.0588	.0462	.0340	.0294	.0046
35	.089	.0615	.0570	.0448	.0329	.0285	.0044
36	.087	.0599	.0555	.0436	.0321	.0278	.0043
37	.085	.0582	.0540	.0424	.0312	.0270	.0042
38	.083	.0568	.0526	.0413	.0304	.0263	.0041
39	.081	.0552	.0512	.0402	.0296	.0256	.0040
40	.079	.0539	.0500	.0393	.0289	.0250	.0039
41	.077	.0525	.0487	.0383	.0281	.0243	.0038
42	.075	.0513	.0476	.0374	.0275	.0238	.0037
43	.073	.0501	.0465	.0365	.0269	.0233	.0036
44	.071	.0489	.0454	.0357	.0262	.0227	.0035
45	.069	.0479	.0444	.0349	.0257	.0222	.0035
46	.068	.0468	.0434	.0341	.0251	.0217	.0034
47	.067	.0458	.0425	.0334	.0246	.0213	.0033
48	.066	.0448	.0416	.0327	.0240	.0208	.0032







# GEAR TOOTH CALIPER.

FOR ENGLISH AND METRIC  
SYSTEMS.

BY MEANS OF A VERNIER DEPTH AND  
THICKNESS OF A GEAR TOOTH CAN BE

MEASURED TO  
 $\frac{1}{1000}$ THS OF AN  
INCH, FOR ALL  
PITCHES FROM

20 DIAMETRAL TO 2 DIAM.

AND ALL PITCHES FROM 12 M/M. TO  $1\frac{1}{4}$  M/M.  
MODULUS.

INVOLUTE GEAR CUTTERS FOR  
CIRCULAR PITCHES  $P'$  IN INCHES.

$P'$	DIAM. OF CUTTER	HOLE.	$P'$	DIAM. OF CUTTER	HOLE.	$P'$	DIAM. OF CUTTER	HOLE.
$\frac{1}{8}$ "	$1\frac{3}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$3\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$4\frac{3}{4}$	$\frac{1}{4}$
"	$2\frac{7}{8}$	$\frac{1}{4}$	"	$3\frac{1}{2}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2
$\frac{3}{16}$	2	$\frac{7}{8}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{1}{4}$	$4\frac{1}{4}$	$\frac{1}{4}$
"	$2\frac{3}{8}$	$\frac{1}{4}$	$\frac{11}{16}$	$3\frac{1}{4}$	$\frac{1}{4}$	"	$4\frac{3}{4}$	$\frac{1}{4}$
$\frac{1}{4}$	2	$\frac{7}{8}$	"	$3\frac{1}{2}$	$\frac{1}{4}$	"	$6\frac{1}{4}$	$1\frac{1}{2}$ OR 2
"	$2\frac{7}{8}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{3}{8}$	$4\frac{1}{2}$	$\frac{1}{4}$
"	$4\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{3}{4}$	$3\frac{3}{8}$	$\frac{1}{4}$	"	$4\frac{3}{4}$	$\frac{1}{4}$
$\frac{5}{16}$	$2\frac{1}{8}$	$\frac{7}{8}$	"	4	$\frac{1}{4}$	"	$6\frac{1}{4}$	$1\frac{1}{2}$ OR 2
"	$2\frac{7}{8}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{1}{2}$	5	$\frac{1}{4}$
"	$4\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{13}{16}$	$3\frac{5}{8}$	$\frac{1}{4}$	"	$6\frac{1}{4}$	$1\frac{1}{2}$ OR 2
$\frac{3}{8}$	$2\frac{1}{2}$	$\frac{1}{16}$	"	4	$\frac{1}{4}$	$\frac{3}{4}$	$5\frac{3}{4}$	$\frac{1}{2}$
"	$2\frac{7}{8}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2	"	$6\frac{1}{4}$	$1\frac{1}{2}$ OR 2
"	$4\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{7}{8}$	$3\frac{5}{8}$	$\frac{1}{4}$	2	$6\frac{1}{2}$	$\frac{1}{2}$
$\frac{7}{16}$	$2\frac{5}{8}$	$\frac{1}{16}$	"	4	$\frac{1}{4}$	"	$7\frac{1}{4}$	$1\frac{1}{2}$ OR 2
"	$3\frac{1}{2}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$2\frac{1}{4}$	7	$\frac{1}{2}$
"	$4\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{15}{16}$	$3\frac{7}{8}$	$\frac{1}{4}$	"	$7\frac{1}{4}$	$1\frac{1}{2}$ OR 2
$\frac{1}{2}$	$2\frac{3}{4}$	$\frac{1}{4}$	"	4	$\frac{1}{4}$	$2\frac{1}{2}$	$7\frac{1}{4}$	$\frac{1}{2}$
"	$3\frac{1}{2}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2	"	$7\frac{1}{4}$	$1\frac{1}{2}$ OR 2
"	$4\frac{1}{4}$	$1\frac{1}{2}$ OR 2	1	$3\frac{7}{8}$	$\frac{1}{4}$	$2\frac{3}{4}$	8	$1\frac{1}{2}$ OR 2
$\frac{9}{16}$	$3\frac{1}{8}$	$\frac{1}{4}$	"	$4\frac{3}{4}$	$\frac{1}{4}$	3	8	$1\frac{1}{2}$ OR 2
"	$3\frac{1}{2}$	$\frac{1}{4}$	"	$5\frac{1}{4}$	$1\frac{1}{2}$ OR 2			
"	$4\frac{1}{4}$	$1\frac{1}{2}$ OR 2	$\frac{1}{8}$	$4\frac{1}{4}$	$\frac{1}{4}$			



# DIMENSIONS OF CUT GEAR TOOTH PARTS.

$P'$  = CIRCULAR PITCH = THE DISTANCE BETWEEN CENTERS OF TWO ADJACENT TEETH MEASURED ON THE PITCH CIRCLE.

$\frac{1}{P}$  = NUMBER OF THREADS OR TEETH PER LINEAR INCH.

$P$  = DIAMETRAL PITCH =  $\frac{3.1416}{P'}$ ;  $T = \frac{P'}{2}$ ;  $C = \frac{T}{10}$ ;

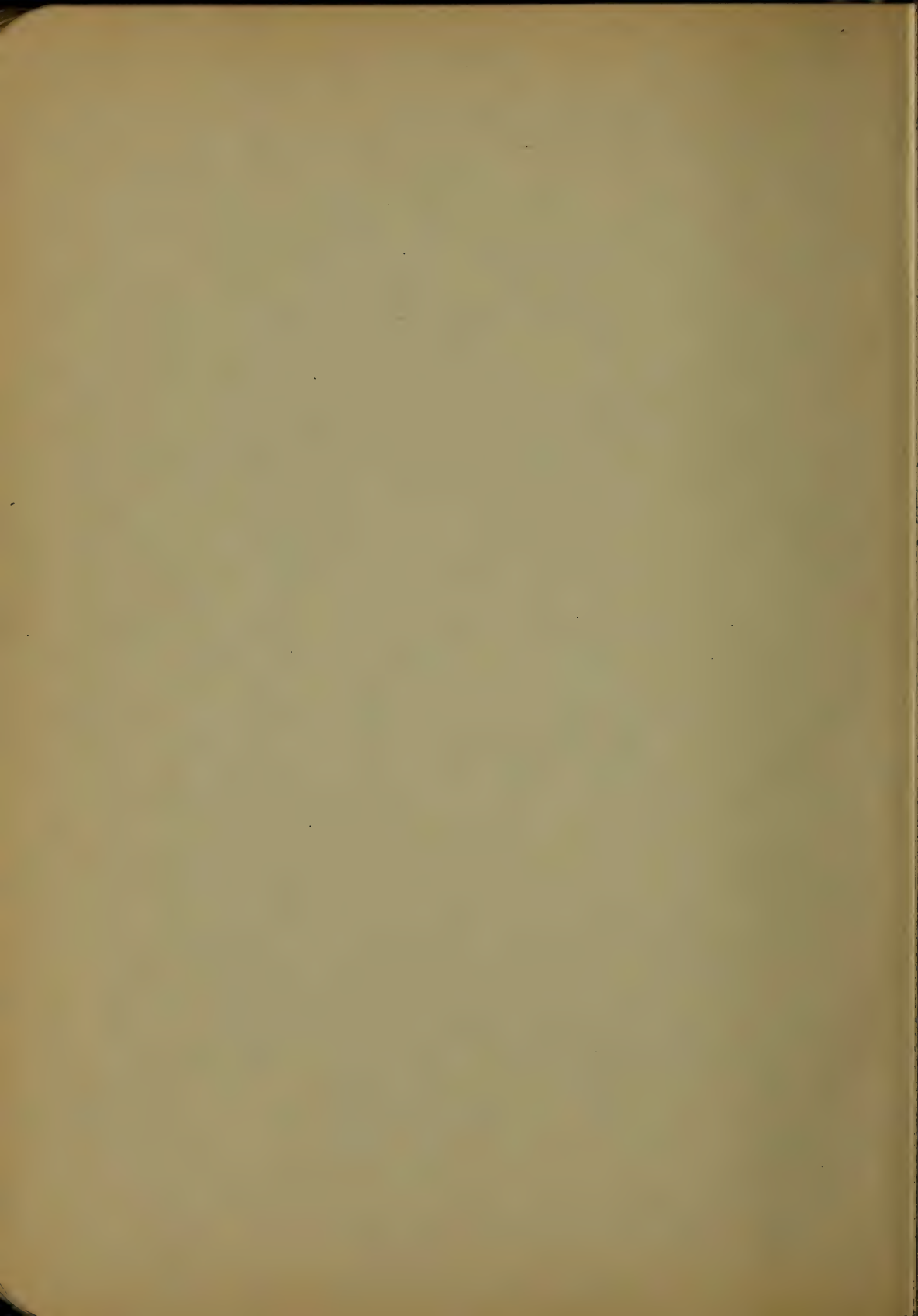
$D+C = .6866 P'$ ;  $D' = .6366 P'$ ;  $S+C = .3683 P'$ ;

$S = .3183 P'$ ;  $D$  = PITCH DIAMETER =  $\frac{NP'}{2}$ ;

$OD$  = OUTSIDE DIAM. OF GEAR BLANK =  $\frac{NP'+2}{3.1416}$ ;

CIRCULAR PITCH  $P'$  IN INCHES.

$\frac{1}{P}$	CIRC. PITCH $P'$	$P$	$D+C$	$D'$	$T$	$S+C$	$S$	$C$
$\frac{1}{3}$	3.000	3"	1.0472	2.0598	1.9098	1.500	1.1049	.9549
$\frac{4}{11}$	2.750	$2\frac{3}{4}$	1.1424	1.8888	1.7513	1.375	1.0131	.8756
$\frac{2}{5}$	2.500	$2\frac{1}{2}$	1.2566	1.7165	1.5915	1.250	.9207	.7957
$\frac{4}{9}$	2.250	$2\frac{1}{4}$	1.3962	1.5448	1.4323	1.125	.8286	.7161
$\frac{1}{2}$	2.000	2	1.571	1.3732	1.2732	1.000	.7366	.6366
$\frac{8}{16}$	1.875	$1\frac{7}{8}$	1.675	1.2874	1.1937	.9375	.6906	.5968
$\frac{4}{7}$	1.750	$1\frac{3}{4}$	1.795	1.2016	1.1141	.8750	.6445	.5570
$\frac{8}{13}$	1.625	$1\frac{5}{8}$	1.933	1.1158	1.0345	.8125	.5985	.5173
$\frac{2}{3}$	1.500	$1\frac{1}{2}$	2.074	1.0299	.9549	.7500	.5525	.4775
$\frac{16}{23}$	1.437	$1\frac{7}{16}$	2.185	.9870	.9152	.7187	.5294	.4576
$\frac{8}{11}$	1.375	$1\frac{3}{8}$	2.285	.9441	.8754	.6875	.5064	.4377
$\frac{16}{21}$	1.312	$1\frac{5}{16}$	2.393	.9012	.8356	.6562	.4834	.4178
$\frac{4}{5}$	1.250	$1\frac{1}{4}$	2.513	.8583	.7958	.6250	.4604	.3979
$\frac{16}{19}$	1.187	$1\frac{3}{16}$	2.646	.8156	.7562	.5937	.4374	.3780
$\frac{8}{9}$	1.125	$1\frac{1}{8}$	2.792	.7724	.7161	.5625	.4143	.3581
$\frac{16}{17}$	1.062	$1\frac{1}{16}$	2.957	.7295	.6764	.5312	.3913	.3382
$\frac{1}{10}$	1.000	1	3.142	.6866	.6366	.5000	.3683	.3183
$\frac{1}{15}$	.937	$\frac{15}{16}$	3.351	.6437	.5969	.4687	.3453	.2984
$\frac{1}{17}$	.875	$\frac{7}{8}$	3.590	.6007	.5570	.4375	.3223	.2785
$\frac{13}{13}$	.812	$\frac{13}{16}$	3.866	.5579	.5173	.4062	.2993	.2586
$\frac{1}{13}$	.750	$\frac{3}{4}$	4.189	.5150	.4775	.3750	.2762	.2387
$\frac{15}{11}$	.687	$\frac{11}{16}$	4.569	.4720	.4376	.3437	.2532	.2189
$\frac{1}{12}$	.666	$\frac{2}{3}$	4.712	.4577	.4244	.3333	.2455	.2122
$\frac{13}{5}$	.625	$\frac{5}{8}$	5.026	.4291	.3978	.3125	.2301	.1989
$\frac{1}{13}$	.562	$\frac{3}{16}$	5.585	.3862	.3581	.2812	.2071	.1790
2	.500	$\frac{1}{2}$	6.283	.3433	.3183	.2500	.1842	.1592
$2\frac{2}{3}$	.457	$\frac{1}{16}$	7.181	.3003	.2785	.2187	.1611	.1393
$2\frac{1}{2}$	.400	$\frac{2}{5}$	7.854	.2746	.2546	.2000	.1473	.1273
$2\frac{2}{5}$	.375	$\frac{3}{8}$	8.377	.2575	.2388	.1875	.1381	.1194
3	.333	$\frac{1}{3}$	9.425	.2289	.2123	.1666	.1228	.1061
$3\frac{1}{5}$	.312	$\frac{5}{16}$	10.053	.2146	.1990	.1562	.1151	.0995
$3\frac{1}{2}$	.285	$\frac{2}{7}$	10.995	.1962	.1819	.1429	.1052	.0910
4	.250	$\frac{1}{4}$	12.566	.1716	.1591	.1250	.0921	.0796
$4\frac{1}{2}$	.222	$\frac{2}{9}$	14.137	.1526	.1415	.1111	.0818	.0707
5	.200	$\frac{1}{5}$	15.708	.1373	.1273	.1000	.0737	.0637
$5\frac{1}{3}$	.187	$\frac{3}{16}$	16.755	.1287	.1193	.0937	.0690	.0597
6	.166	$\frac{1}{6}$	18.850	.1144	.1061	.0833	.0614	.0531
7	.142	$\frac{1}{7}$	21.991	.0981	.0910	.0714	.0526	.0453
8	.125	$\frac{1}{8}$	25.133	.0858	.0795	.0625	.0460	.0398
9	.111	$\frac{1}{9}$	28.274	.0763	.0708	.0555	.0409	.0354
10	.100	$\frac{1}{10}$	31.416	.0687	.0637	.0500	.0368	.0318
12	.083	$\frac{1}{12}$	37.449	.0569	.0527	.0416	.0305	.0263
16	.062	$\frac{1}{16}$	50.265	.0429	.0398	.0312	.0230	.0199







## COMPARATIVE SIZES OF GEAR TOOTH.

8 D.P. = .393" C.P.

3 DIAM. PITCH = 1.047" CIRC. PITCH

2 DIAM. PITCH = 1.571" CIRC. PITCH.

10 D.P. = .314" C.P.

4 D.PITCH = .785" C.P.

6 D.P. = .524" C.P.

2½ DIAM. PITCH = 1.257" CIRC. PITCH.

7 D.P. = .449" C.P. 5 D.P. = .628" C.P.

## PRESSURE ON CAST IRON GEARS. RACKS.

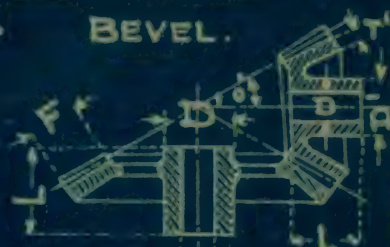
## DIAMETRICAL PITCH. P.

## CIRCULAR PITCH P'

DIAM. PITCH.	CORRESP'G CIRCULAR PITCH INCHES.	SPUR GEARS			BEVEL GEARS MORTISE SPUR		CIRCULAR PITCH INCHES.	SPUR GEARS			BEVEL & MORTISE SPUR GEARS	
		LENGTH OF TOOTH.	PRESSURE ON TOOTH LBS.	MOMENT OF FORCE INCH. LBS.	PRESSURE ON TOOTH LBS.	MOMENT OF FORCE INCH. LBS.		LENGTH OF TOOTH FACE.	PRESSURE ON TOOTH LBS.	MOMENT OF FORCE INCH. LBS.	PRESSURE ON TOOTH LBS.	MOMENT OF FORCE INCH. LBS.
1	3.142	10"	4950	2555	3300	1700	3	10	4500	2226	3000	1484
1¼	2.513	8	3160	1285	2170	860	2½	8	3125	1283	2084	856
1½	2.094	7	2200	746	1465	505	2	7	2000	658	1414	437
1¾	1.794	6	1610	472	1075	315	1¾	6	1530	440	1020	304
2	1.571	5	1235	318	823	212	1½	5	1125	277	750	185
2½	1.257	4	800	163	634	109	1¼	4	781	160	520	107
3	1.047	3½	550	94	368	63	1	3½	500	82	334	55
4	.785	3	310	40	207	27	¾	3¼	382	55	256	37
5	.628	2½	200	20	134	14	¾	3	281	35	188	23
6	.524	2¼	137	11	92	7½	¾	2¾	195	20	130	14
7	.449	2	100	7.4	67	5	½	2½	125	10	83	7
8	.393	2	77	5	52	3.3	¾	2	70	4.3	57	3
10	.314	1½	50	2.5	34	1.7	½	2	55	3	37	2



# HORSE POWER AND DIMENSIONS OF GEAR WHEELS.



P = DIAM. PITCH. P<sub>c</sub> = CIRC. PITCH. **TABLE FOR CAST IRON SPUR GEARS.** MITER GEAR 0°-45°

FOR

BEVEL AND MORTISE SPUR GEAR INCREASE NUMBER OF TEETH BY ONE-THIRD, FOR BEVEL MORTISE GEARS WITH  $\frac{2}{3}$  FOR THE SAME PITCH.

DIAM. OF SHAFT INCH. D	ACTUAL HORSE POWER PER REVOLU- TION	DIAM. OF HUB OF WHEEL INCHES. D	NUMBER OF TEETH IN WHEEL.										RIM MIN. T MAX. T		
			3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	FACE OF GEAR F. INCH.	LENGTH OF HUB L. INCH.	
			1/2	5/8	11/16	3/4	7/8	1 1/16	1 1/4	1 3/8	1 1/2	1 5/8			
			2 1/4	2 5/8	3	3 1/2	4	5	6	7	8	10			
			2 7/8	3 1/4	3 3/4	4 3/8	5	6 1/4	7 1/2	8 3/4	10	12 1/2			
			6	5	4	3	2 1/2	2	1 3/4	1 1/2	1 1/4	1			
			1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/2"	3"			
APPROX. CIRCULAR PITCH INCHES															
ARMS OF WHEELS.															
															
DIAM. L. PITCH															
A B															
15/16	.012	1 7/8	32	29	23	17	12	.	.	.	.	.	10	5/8	3/8
1 1/16	.024	2 3/8	54	34	27	25	19	15	.	.	.	.	8	3/4	7/16
1 1/8	.042	2 7/8	90	56	37	48	32	24	12	.	.	.	7	15/16	1/2
1 1/4	.067	3 3/8	160	98	56	83	51	36	17	.	.	.	6	1 1/8	9/16
1 1/2	.1	4		175	93	133	77	52	21	12	.	.	5	1 1/4	11/16
2 1/16	.143	4 1/2			142	200	110	71	28	17	.	.	4	1 5/8	7/8
2 1/8	.195	5			210	285	150	94	39	23	12	.	3	2 1/4	1 1/8
2 1/4	.26	5 1/2				360	200	122	56	31	15	.	2 1/2	2 7/8	1 3/8
2 1/2	.338	6 1/4					260	155	67	40	18	.	2	3 1/4	1 7/8
3 1/16	.425	6 5/8					330	194	84	51	22	12	1 3/4	3 3/8	2 1/8
3 1/8	.535	7						239	106	64	27	15	1 1/2	4 1/4	2 1/2
3 1/4	.66	7 1/2						284	130	78	33	19	1 1/4	5 1/4	3
3 1/2	.8	8 1/4						338	178	98	42	21	1 1/2	6 1/2	4
4 1/16	.94	8 3/4							189	111	49	25	1		
4 1/8	1.11	9 1/4							212	128	54	28			
4 1/4	1.34	9 3/8							264	159	68	32			
4 1/2	1.56	10 1/4							320	186	79	38			
5 1/16	2.09	10 3/8								247	105	43			
5 1/8	2.72	12								331	137	53			
6 1/16	3.42	13									184	69			
6 1/8	4.28	14 1/4									235	100			
7 1/16	6.24	15 3/4									292	138			
8 1/16	8.92	17 3/4									350	185			
9 1/16	10.94	20										234			
10 1/16	13.08	22										281			
11 1/16	17.01	24										340			



DIAM. L. PITCH	A	B
10	$\frac{5}{8}$	$\frac{3}{8}$
8	$\frac{3}{4}$	$\frac{7}{16}$
7	$\frac{15}{16}$	$\frac{1}{2}$
6	$\frac{1}{8}$	$\frac{9}{16}$
5	$\frac{1}{4}$	$\frac{1}{16}$
4	$\frac{1}{8}$	$\frac{7}{8}$
3	$\frac{1}{4}$	$\frac{1}{8}$
2 $\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$
2	$\frac{3}{4}$	$\frac{1}{8}$
1 $\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$
1 $\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$
1	$\frac{5}{4}$	3
$\frac{1}{2}$	$\frac{6}{2}$	4

FOR SINGLE ARMS.





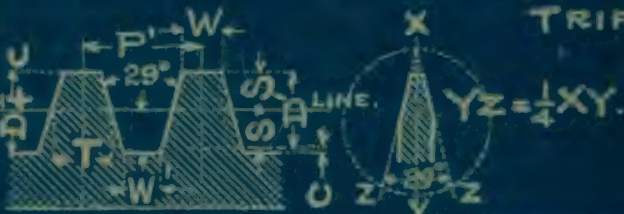


# DIMENSIONS OF WORMS AND WORMWHEELS.



FACE OF WORMWHEEL SHOULD NOT EXCEED  
.4375 x DIAMETER OF WORM.

TABLE GIVES DIMENSIONS OF SINGLE THREADS  
ONLY. FOR MULTIPLE THREADS DIVIDE SIZES FOR  
THE SAME PITCH BY 2 FOR DOUBLE, 3 FOR  
TRIPLE, ETC.

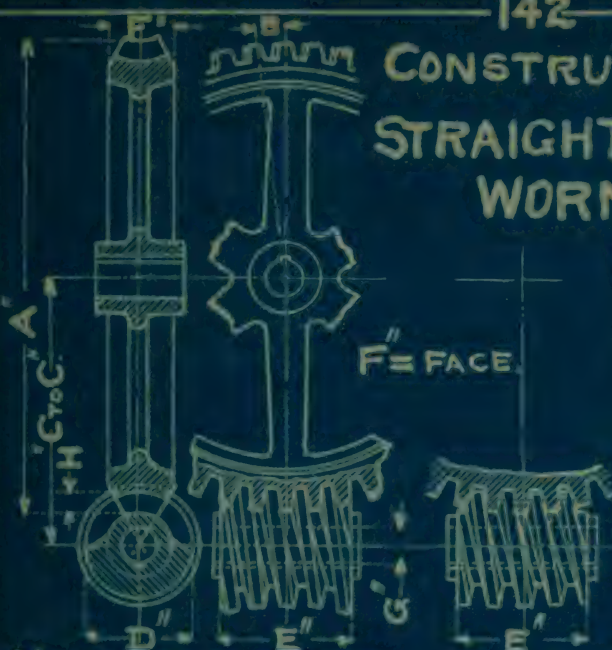


CIRCUMF. PITCH.	THREADS PER INCH	DIAMETRAL PITCH	WHOLE DEPTH OF TOOTH	WORKING DEPTH OF TOOTH	THICKNESS OF TOOTH AT PITCH LINE	DEPTH OF SPACE BELOW P. LINE.	WIDTH OF THREAD AT TOP.	TOOTH ABOVE PITCH LINE	WIDTH OF THREAD AT BOTTOM	CLEARANCE
D'	1/P'	P	D'+C	D'	T	S+C	W	S	W'	C
2	1/2	1.5708	1.3527	1.2732	1.0000	.7161	.6708	.6366	.6296	.0795
1 3/4	4/3	1.7952	1.1837	1.1141	.8750	.6266	.5869	.5570	.5509	.0696
1 1/2	3/2	2.0944	1.0145	.9549	.7500	.5371	.5031	.4775	.4722	.0596
1 1/4	4/5	2.5133	.8455	.7958	.6250	.4476	.4182	.3979	.3935	.0497
1	1	3.1416	.6763	.6366	.5000	.3580	.3354	.3183	.3148	.0397
3/4	1 1/3	4.1888	.5073	.4775	.3750	.2685	.2515	.2387	.2361	.0298
2/3	1 1/2	4.7124	.4509	.4244	.3333	.2387	.2236	.2122	.2098	.0265
1/2	2	6.2832	.3382	.3183	.2500	.1791	.1677	.1592	.1574	.0199
2/5	2 1/2	7.8540	.2705	.2546	.2000	.1432	.1341	.1273	.1259	.0159
1/3	3	9.4248	.2254	.2122	.1666	.1193	.1118	.1061	.1049	.0132
2/7	3 1/2	10.9956	.1938	.1819	.1429	.1022	.0958	.0909	.0899	.0113
1/4	4	12.5664	.1690	.1591	.1250	.0895	.0838	.0796	.0787	.0099
3/8	4 1/2	14.1372	.1503	.1415	.1111	.0785	.0745	.0707	.0699	.0088
1/5	5	15.7080	.1352	.1273	.1000	.0716	.0670	.0637	.0629	.0079
1/6	6	18.8496	.1127	.1061	.0833	.0597	.0559	.0531	.0524	.0066
1/7	7	21.9911	.0966	.0910	.0714	.0511	.0479	.0455	.0449	.0056
1/8	8	25.1327	.0845	.0796	.0625	.0447	.0419	.0398	.0393	.0049
1/9	9	28.2743	.0752	.0707	.0555	.0398	.0372	.0354	.0349	.0044
1/10	10	31.4159	.0676	.0637	.0500	.0357	.0335	.0318	.0314	.0039
1/12	12	37.6992	.0563	.0530	.0416	.0298	.0279	.0265	.0262	.0033
1/14	14	43.9824	.0482	.0454	.0357	.0255	.0239	.0227	.0224	.0028
1/16	16	50.2655	.0422	.0398	.0312	.0223	.0209	.0199	.0196	.0024
1/18	18	56.5488	.0374	.0352	.0277	.0198	.0189	.0176	.0174	.0022

WORM GEARS ARE SELF LOCKING & NON REVERSABLE.



# CONSTRUCTIONAL DIMENSIONS OF STRAIGHT AND HINDLEY-ALBRO WORM GEARING.

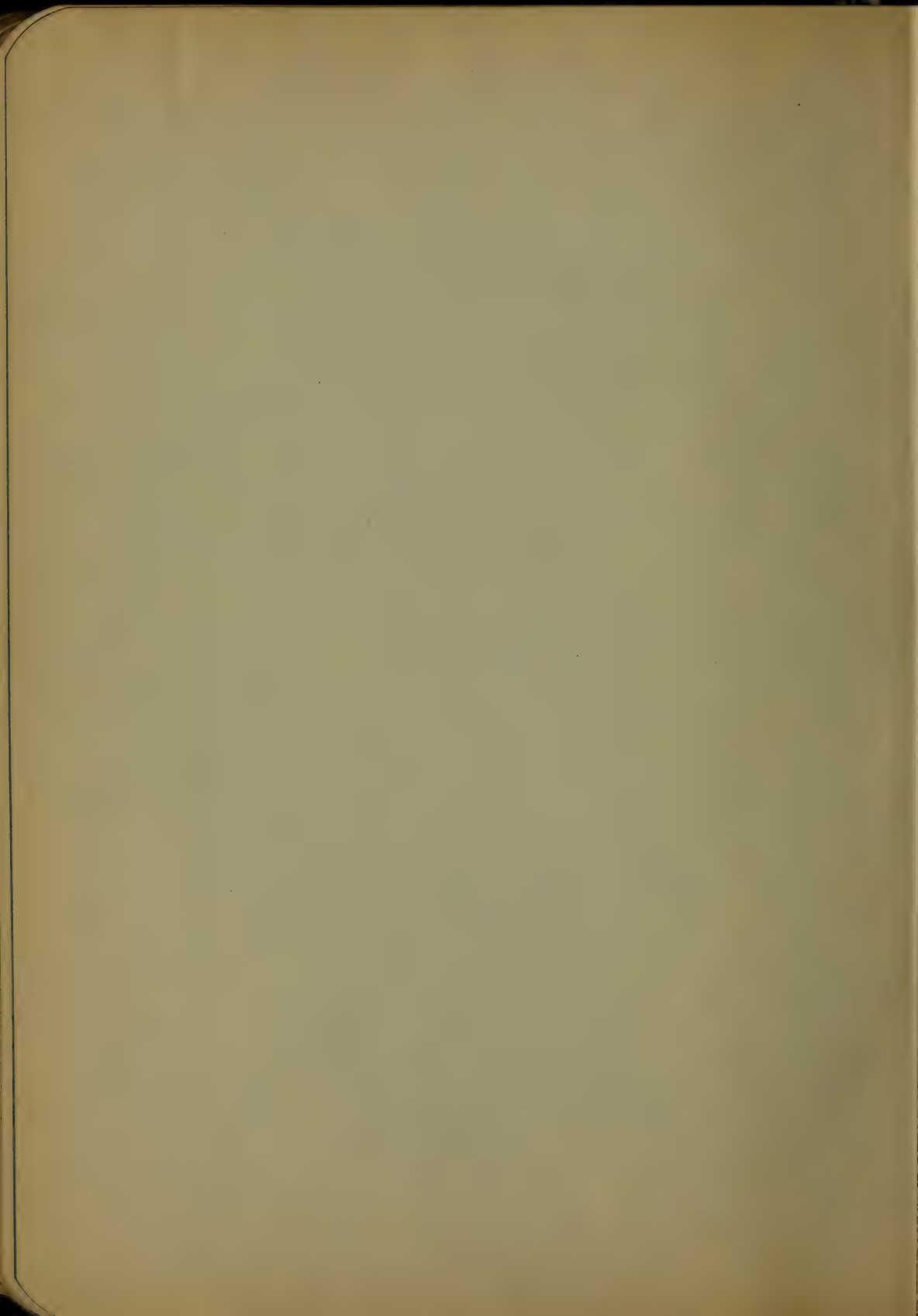


RATIO = NUMBER OF TEETH  
OF WHEEL TO NUMBER OF  
THREADS OF WORM - OR  
NUMBER OF REVOLUTIONS  
OF WORM TO NUMBER OF  
REVOLUTIONS OF WHEEL.  
C to C = CENTER OF  
WHEEL TO CENTER OF  
WORM, IN INCHES.

N = NUMBER OF TEETH.

S = NUMBER OF THREADS.

RATIO	C to C	WORM WHEEL.					WORM.			
		A"	N	B"	H"	F"	D"	E"	S	G"
7 to 1	3.369	4.968	14	2.23	.6"	1 1/2"	2.85	2.4	2	
"	4.154	6.434	28	2.88	9/16	1 1/2	3	3	4	
7 3/4 to 1	4.5	7.125	31	2.88	9/16	1 1/2	3	3	4	
8 to 1	3.6715	5.693	16	2.23	.6	1 1/2	2.85	2.4	2	
"	3.761	5.62	16	2.208	.6	1.6	3.1	2.5	2	
8 1/2 " 1	4.844	7.813	34	2.88	9/16	1 1/2	3	3	4	
9 " 1	4.0164	6.388	18	2.23	.6	1 1/2	2.85	2.4	2	
"	4.115	6.33	18	2.208	.6	1.6	3.1	2.5	2	
9 1/2 " 1	7 3/4	12 17/32	38	4	7/8	1 7/8	4 3/4	4	4	
"	15.359	23.719	38	8	1 1/4	4	10	10	4	3 1/16
10 " 1	4.45	7.02	20	2.208	.6	1.6	3.1	2.5	2	
"	8.1	13.02	40	4	7/8	1 7/8	4 3/4	4	4	
"	15.984	24.468	40	8	1 1/2	4	10	10	4	3 1/16
10 1/2 " 1	8 2/64	18 45/64	42	4	7/8	1 7/8	4 3/4	4	4	
"	16.607	26.215	42	8	1 1/2	4	10	10	4	3 1/16
11 " 1	5.616	9.033	22	2.58	.85	2	3.8	3	2	
"	10.0306	17.436	33	4.99	1 3/16	4	5	7	3	1 1/16
11 1/10 " 1	10.609	18.593	35	4.99	1 3/16	4	5	7	3	1 1/16
12 " 1	6.0355	9.871	24	2.58	.85	2	3.8	3	2	
12 2/3 " 1	11.381	20.078	38	4.99	1 3/16	4	5	7	3	1 1/16
13 " 1	6.437	10.675	26	2.58	.85	2	3.8	3	2	
13 1/2 " 1	9.94	14.506	27	3 3/8	1 3/8	4	8 1/8	7	2	2 1/16
14 " 1	10.209	15.044	28	3 3/8	1 3/8	4	8 1/8	7	2	2 1/16
"	10.951	18.528	56	4.158	3/4	3 3/4	4 7/8	5 3/4	4	
15 " 1	10.76	16.125	30	3 3/8	1 3/8	4	8 1/8	7	2	2 1/16
"	11.614	19.854	60	4.158	3/4	3 3/4	4 7/8	5 3/4	4	







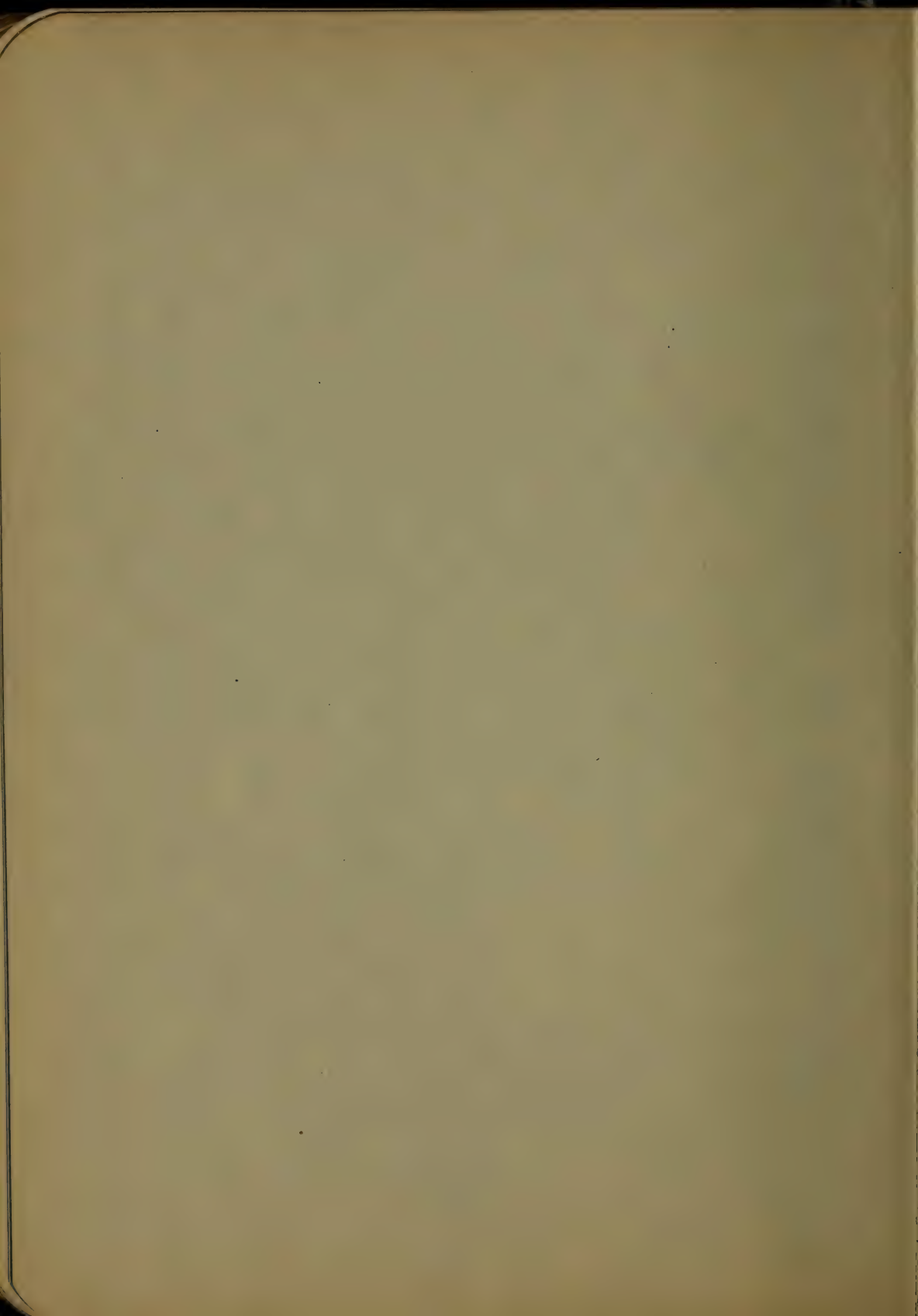
## STRAIGHT AND HINDLY-ALBRO WORM GEARING.

RATIO	C <sub>to</sub> C"	WORM WHEEL					WORM.			
		A"	N	B"	H"	F"	D"	E"	S	G"
15½ to 1	11.015	16.655	31	3⅜	1⅜	4	8⅞	7	2	2⅞/16
16 " 1	11.28	17.193	32	3⅜	1⅜	4	8⅞	7	2	2⅞/16
" "	12.473	21.172	64	4.158	¾	3⅜	4⅞	5⅜	4	2⅞/16
16½ " 1	11.552	17.730	33	3⅜	1⅜	4	8⅞	7	2	2⅞/16
17 " 1	17.138	28.933	36	5	1⅞	4	9⅜	10	2	3⅞/16
" "	20.402	35.304	54	6	1¾	4½	9	10	3	3⅞/16
18⅝ " 1	21.062	36.625	56	6	1¾	4½	9	10	3	3⅞/16
19 " 1	21.809	38.119	58	6	1¾	4½	9	10	3	3⅞/16
19⅓ " 1	7⅞/32	10⅞/32	20	1⅝	1⅜	2¼	4⅜	7	1	3⅞/16
20 " 1	15.692	25.54	40	4	1¾	4	9⅜	8⅜	2	3⅞/16
" "	18.749	32.156	40	5	1⅞	4	9⅜	10	2	3⅞/16
21 " 1	4.49	7.105	21	1.063	⅝	1½	3½	2½	1	4⅞/16
" "	15.144	26.889	42	4	1¾	3½	7	10¼	2	4⅞/16
21½ " 1	8.41	13.82	43	2	1	2½	5	5	2	3⅞/16
" "	16.656	27.468	43	4	1¾	4	9⅜	8⅜	2	3⅞/16
22 " 1	6.46	10.43	44	1½	¾	2	4	4	2	1⅞/16
" "	16.79	28.08	44	4	1¾	4	9	10¼	2	2⅞/16
" "	20.358	35.363	44	5	1⅞	4	9⅜	10	2	3⅞/16
22½ " 1	8.79	14.52	45	2	1	2½	5	5	2	2⅞/16
" "	16.156	28.812	45	4	1¾	3½	7	10¼	2	2⅞/16
23 " 1	8.09	12.87	23	1¾	1⅞/16	3⅞	6⅞	8	1	3⅞/16
" "	17.707	29.571	46	4	1¾	4	9⅜	8⅜	2	3⅞/16
" "	18.97	33⅞/64	69	4⅞/16	1	3	6	6½	3	5⅞/16
23½ " 1	6.82	11.15	47	1½	¾	2	4	4	2	1⅞/16
" "	17.75	30.0	47	4	1¾	4	9	10¼	2	3⅞/16
24 " 1	8¼	12⅞/32	24	1⅝	1⅞/16	2¼	4⅜	7	1	3⅞/16
" "	10.11	15.35	48	2	1	3½	6⅞	5	2	3⅞/16
" "	17.115	30.73	48	4	1¾	3½	7	10¼	2	2⅞/16
" "	19⅞/16	35⅞/8	72	4⅞/16	1	3	6	6½	3	3⅞/16
" "	5	8.125	24	1.063	⅝	1½	3⅞	2½	1	1⅞/16
24½ " 1	7.06	11.62	49	1½	¾	2	4	4	2	1⅞/16
25 " 1	10.43	16.0	50	2	1	3½	6⅞	5	2	3⅞/16
" "	20⅞/64	36.⅞/32	75	4⅞/16	1	3	6	6½	3	3⅞/16
26 " 1	8.93	14.56	26	1¾	1⅞/16	3⅞	6⅞	8	1	1⅞/16
" "	12.012	20.775	52	2½	1⅞	3	6	6	2	3⅞/16
26½ " 1	10.91	16.95	53	2	1	3½	6⅞	5	2	3⅞/16
27 " 1	5.5	9.135	27	1.063	⅝	1½	3⅞	2½	1	2⅞/16
" "	8.69	12.89	27	1½	1⅞/16	3⅞	4½	4½	1	2⅞/16
27½ " 1	13.897	24.264	55	2¾	1¼	3	6⅞	10¼	2	2⅞/16



## STRAIGHT AND HINDLY-ALBRO WORM GEARING.

RATIO	C TO C"	WORM WHEEL					WORM			
		A"	N	B"	H"	F"	D"	E'	S	G"
28 To 1	9 9/32	14 3/64	28	1 5/8	1 9/64	2 1/4	4 3/32	7	1	
"	12.812	22.375	56	2 1/2	1 3/8	3	6	6	2	1 15/16
"	15.438	26.737	56	3	1 3/8	3 1/2	6 5/64	10 1/4	2	2 3/16
28 1/2 " 1	15.677	27.214	57	3	1 3/4	3 1/2	6 57/64	10 1/4	2	2 3/16
29 " 1	16 3/64	2.596	29	9/32	2 1/6	15/16	1 3/4	7/8	1	
"	9.76	16.227	29	1 3/4	1 7/16	3 1/8	6 3/16	8	1	
29 1/2 " 1	14.781	26.03	59	2 3/4	1 1/4	3	6 1/2	10 1/8	2	2 15/16
"	16.156	28.171	59	3	1 3/8	3 1/2	6 5/64	10 1/4	2	2 3/16
30 " 1	9.5	14.5	30	1 1/2	1 1/16	3 1/2	4 1/2	4 1/2	1	
"	11.45	19.40	60	2	1	3 1/8	5 1/2	8 1/4	2	2 3/16
"	13.61	23.977	60	2 1/2	1 3/8	3	6	6	2	1 15/16
"	16.393	28.647	60	3	1 3/8	3 1/2	6 57/64	10 1/2	2	2 3/16
"	22.658	38.443	60	4	1 3/4	5	10 3/8	10	2	4 1/16
31 " 1	13.901	21.313	31	2.16	1 5/8	5	9.74	7 1/2	1	
"	15.441	27.352	62	2 3/4	1 1/4	3	6 1/32	10 1/4	2	2 3/16
"	16.861	29.581	62	3	1 3/8	3 1/4	6 57/64	10 1/4	2	2 15/16
"	26 27/32	49 3/8	93	5 1/16	1 7/16	3 1/2	6 1/4	9 3/4	3	
31 1/2 " 1	9.82	17.53	63	1 3/4	2 1/4	2 1/4	3 5/8	4 1/2	2	
"	11.8125	20.125	63	2	1	3 1/8	5 1/2	8 1/4	2	2 3/16
"	17.109	30.079	63	3	1 3/8	3 1/2	6 57/64	10 1/4	2	2 3/16
"	23.625	40.375	63	4	1 3/4	5	10 3/8	10	2	4 1/16
32 " 1	2 1/8	2 7/8	32	7/32	3/16	15/16	1 3/4	7/8	1	
"	3.49	4.305	32	.4	3/8	1 1/4	3 3/16	2 5/8	1	1 7/16
"	11.816	19.118	36	1 7/8	1 3/8	4	7 11/32	7 1/2	1	
"	25 1/4	51 1/32	96	5 1/16	1 3/32	3 1/4	6 1/4	9 3/4	3	
33 " 1	10 1/8	15.75	33	1 1/2	1 1/16	3 1/2	4 1/2	4 1/2	1	
"	10 1/4	18.375	66	1 3/4	3/4	2 1/4	3 5/8	4 1/2	2	
"	10.84	16.74	33	1 9/16	1 5/16	3 1/2	6 13/16	6	1	2 15/16
"	11.956	19.537	33	1 7/8	1 1/4	3 1/2	6 7/8	9	1	
"	12.421	21.34	66	2	1	3 1/8	5 1/2	8 1/4	2	2 3/16
"	19.613	33.351	66	3.17	1 3/8	4	8 5/8	12	2	
"	24.521	42.288	66	4	1 3/4	5	10 3/8	10	2	4 1/16
"	28.49	53 11/64	99	5 1/16	1 7/32	3 1/4	6 1/4	9 3/8	3	
"	13.406	22.688	33	2.16	1 5/8	4	7 3/8	7 1/2	1	
34 " 1	14.937	23.37	34	2.16	1 5/8	5	9.74	7 1/2	1	
35 " 1	2 1/4	3.133	35	9/32	3/16	15/16	1 3/4	7/8	1	
"	10.80	19.488	70	1 3/4	3/4	2 1/4	3 5/8	4 1/2	2	
"	20.625	35.375	70	3.17	1 3/8	4	8 5/8	12	2	
36 " 1	3.765	4.842	36	.4	3/8	1 1/4	3 3/16	2 5/8	1	1 7/16
"	4.564	7.161	36	.625	1/2	1 1/4	2 3/16	3 1/2	1	
"	12.875	21.375	36	1 7/8	1 1/4	3 1/2	6 7/8	9	1	







## STRAIGHT AND HINDLEY-ALBRO WORM GEARING.

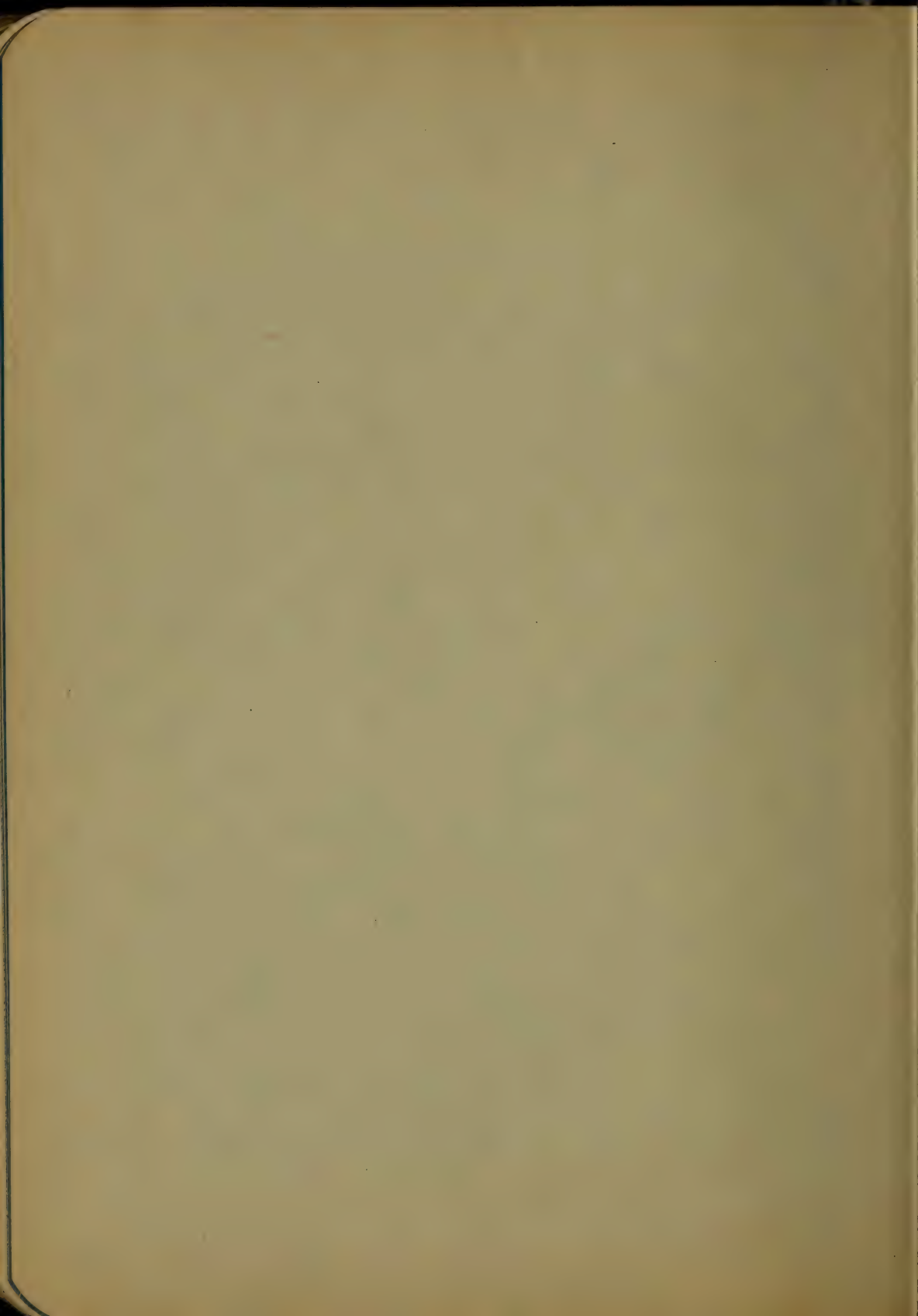
RATIO	C to C"	WORMWHEEL					WORM			
		A"	N	B"	H"	F"	D"	E"	S	G"
36 to 1	13.0	21.484	36	1 $\frac{7}{8}$	1 $\frac{3}{8}$	4	7 $\frac{1}{4}$	7 $\frac{1}{2}$	1	
"	14.468	24.812	36	2.16	1 $\frac{5}{8}$	4	7 $\frac{3}{8}$	7 $\frac{1}{2}$	1	
"	31.03	51.56	36	4 $\frac{1}{2}$	2 $\frac{3}{8}$	6	12	12 $\frac{3}{4}$	1	4
37 " 1	4.730	7.36	37	.625	$\frac{1}{2}$	1 $\frac{1}{4}$	3.1	3 $\frac{1}{2}$	1	
"	21.624	37.394	74	3.17	1 $\frac{3}{8}$	4	8 $\frac{5}{8}$	12	2	
37 $\frac{1}{2}$ " 1	22.267	38.785	75	3 $\frac{1}{4}$	1 $\frac{7}{16}$	4 $\frac{1}{4}$	8 $\frac{5}{8}$	9	2	3 $\frac{7}{16}$
38 " 1	16.318	26.147	38	2.16	1 $\frac{5}{8}$	5	9.74	7 $\frac{1}{2}$	1	
"	30.574	54.429	76	4 $\frac{1}{2}$	1 $\frac{7}{8}$	6	10 $\frac{15}{32}$	11	2	3 $\frac{15}{16}$
38 $\frac{1}{2}$ " 1	27.94	48.884	77	3 $\frac{3}{8}$	1 $\frac{3}{4}$	5 $\frac{1}{2}$	10 $\frac{1}{2}$	12 $\frac{3}{4}$	2	
39 " 1	7.624	12.873	39	1	$\frac{7}{8}$	1 $\frac{7}{8}$	4 $\frac{1}{8}$	3 $\frac{3}{8}$	1	1 $\frac{7}{16}$
"	12.183	19.43	39	1 $\frac{9}{16}$	1 $\frac{5}{16}$	3 $\frac{1}{2}$	6 $\frac{1}{16}$	6	1	2 $\frac{5}{16}$
"	13.232	22.089	39	1 $\frac{7}{8}$	1 $\frac{1}{4}$	3 $\frac{1}{2}$	6 $\frac{7}{8}$	9	1	
"	13.902	23.291	39	1 $\frac{7}{8}$	1 $\frac{3}{8}$	4	7 $\frac{1}{4}$	7 $\frac{1}{2}$	1	
"	14 $\frac{3}{4}$	24 $\frac{53}{64}$	39	2	1 $\frac{25}{32}$	3 $\frac{1}{4}$	6 $\frac{15}{32}$	10 $\frac{1}{4}$	1	
40 " 1	4.034	5.381	40	.4	$\frac{3}{8}$	1 $\frac{1}{4}$	3 $\frac{3}{16}$	2 $\frac{5}{8}$	1	1 $\frac{7}{16}$
"	15.813	27.501	40	2.16	1 $\frac{5}{8}$	4	7 $\frac{3}{8}$	7 $\frac{1}{2}$	1	
"	23.562	41.375	80	3 $\frac{1}{4}$	1 $\frac{7}{16}$	4 $\frac{1}{4}$	8 $\frac{5}{8}$	9	2	3 $\frac{7}{16}$
"	28.25	49.5	80	3 $\frac{3}{8}$	1 $\frac{3}{4}$	5 $\frac{1}{2}$	10 $\frac{1}{2}$	12 $\frac{3}{4}$	2	
"	32.007	57.296	80	4 $\frac{1}{2}$	1 $\frac{7}{8}$	6	10 $\frac{15}{32}$	11	2	3 $\frac{15}{16}$
41 " 1	5.069	8.17	41	.625	$\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{3}{16}$	3 $\frac{1}{2}$	1	
"	14 $\frac{25}{32}$	26 $\frac{7}{64}$	41	2	1 $\frac{25}{32}$	3 $\frac{1}{4}$	6 $\frac{15}{32}$	10 $\frac{1}{4}$	1	
41 $\frac{1}{2}$ " 1	29.16	51.32	83	3 $\frac{3}{8}$	1 $\frac{3}{4}$	5 $\frac{1}{2}$	10 $\frac{1}{2}$	12 $\frac{3}{4}$	2	
42 " 1	5.23	8.35	42	.625	$\frac{1}{2}$	1 $\frac{1}{4}$	3.1	3 $\frac{1}{2}$	1	
"	8.125	13.875	42	1	$\frac{7}{8}$	1 $\frac{7}{8}$	4 $\frac{1}{8}$	3 $\frac{3}{8}$	1	1 $\frac{7}{16}$
42 $\frac{1}{2}$ " 1	33.769	60.874	85	4 $\frac{1}{2}$	1 $\frac{7}{8}$	6	10 $\frac{1}{2}$	11	2	3 $\frac{15}{16}$
43 " 1	11.153	18.87	43	1 $\frac{3}{8}$	1 $\frac{1}{8}$	3 $\frac{1}{8}$	5 $\frac{11}{16}$	8 $\frac{1}{4}$	1	2 $\frac{3}{16}$
"	22.86	37.63	43	2 $\frac{3}{8}$	2 $\frac{1}{8}$	5 $\frac{3}{4}$	12.35	11 $\frac{3}{4}$	1	
44 " 1	13.468	22.0	44	1 $\frac{9}{16}$	1 $\frac{5}{16}$	3 $\frac{1}{2}$	6 $\frac{1}{16}$	6	1	2 $\frac{15}{16}$
"	13.94	24.455	44	1 $\frac{3}{4}$	1 $\frac{3}{8}$	3	6 $\frac{3}{16}$	10 $\frac{1}{4}$	1	2 $\frac{1}{16}$
"	15 $\frac{9}{64}$	28 $\frac{1}{64}$	44	2	1 $\frac{25}{32}$	3 $\frac{1}{4}$	6 $\frac{15}{32}$	10 $\frac{1}{4}$	1	
"	36.75	63.0	44	4 $\frac{1}{2}$	2 $\frac{3}{8}$	6	12	12 $\frac{3}{4}$	1	4
45 " 1	9.01	14.52	45	1	$\frac{1}{2}$	2 $\frac{1}{2}$	5 $\frac{1}{2}$	6	1	2 $\frac{15}{16}$
"	23.75	39.4	45	2 $\frac{3}{4}$	2 $\frac{1}{8}$	5 $\frac{3}{4}$	12.35	11 $\frac{3}{4}$	1	
46 " 1	3.513	5.527	46	$\frac{3}{8}$	$\frac{3}{8}$	1 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$	1	1 $\frac{3}{16}$
"	5.559	9.151	46	$\frac{5}{8}$	$\frac{1}{2}$	1 $\frac{1}{4}$	2 $\frac{3}{8}$	3 $\frac{1}{2}$	1	
"	8.779	15.183	46	1	$\frac{7}{8}$	1 $\frac{7}{8}$	4 $\frac{1}{8}$	3 $\frac{3}{8}$	1	1 $\frac{7}{16}$
"	11.812	20.187	46	1 $\frac{3}{8}$	1 $\frac{1}{8}$	3 $\frac{1}{8}$	5 $\frac{11}{16}$	8 $\frac{1}{4}$	1	2 $\frac{3}{16}$
"	19.736	34.84	46	2 $\frac{3}{8}$	1 $\frac{15}{16}$	4 $\frac{1}{4}$	8 $\frac{1}{4}$	9 $\frac{3}{4}$	1	
47 " 1	14.781	26.125	47	1 $\frac{3}{4}$	1 $\frac{3}{8}$	3	6 $\frac{1}{16}$	10 $\frac{1}{4}$	1	2 $\frac{15}{16}$
"	16.169	25.245	47	1 $\frac{11}{16}$	1 $\frac{1}{8}$	3 $\frac{3}{4}$	9 $\frac{1}{32}$	7	1	



## STRAIGHT AND HINDLEY-ALBROW WORM GEARING.

RATIO	C <sub>TO</sub> C <sup>*</sup>	WORM WHEEL.					WORM.			
		A"	N	B"	H"	F"	D"	E"	S	G"
47 to 1	5.725	9.35	47	5/8	1/2	1 1/4	3.1	3 1/2	1	
"	17.994	30.817	47	2.06	1 1/2	4 1/2	8 1/4	9	1	
"	24.621	41.142	47	2 3/4	2 1/8	5 3/4	12.35	11 3/4	1	
"	22.297	39.345	47	2.63	2	5 5/8	9 1/4	10 3/4	1	
48 to 1	9 1/2	15 1/2	48	1	1	2 1/2	5 1/2	6	1	2 15/16
"	15.323	26.647	48	1 3/4	1 3/8	3 1/2	7 3/2	10 1/4	1	2 3/16
"	20.562	36 1/2	48	2.38	1 3/16	4 1/4	8 1/4	9 3/4	1	
"	22.99	40 3/16	48	2.63	2	4 3/8	9 13/16	10	1	
49 to 1	12.47	21.503	49	1 3/8	1 1/8	3 1/8	5 1/2	8 1/4	1	2 3/16
"	23.187	41.125	49	2.63	2	5 5/8	9 1/4	10 3/4	1	
50 to 1	15.614	27.79	50	1 3/4	1 3/8	3	6 3/16	10 1/4	1	2 15/16
"	17.0	26 2/32	50	1 1/16	1 1/8	3 3/4	9 1/2	7	1	
"	19.0	32.828	50	2.06	1 1/2	4 1/2	8 1/4	9	1	
"	21.251	37.877	50	2.38	1 13/16	4 1/4	8 1/4	9 3/4	1	
"	23.654	39.808	50	2 1/2	1 3/4	7	9	13	1	3 1/4
51 to 1	3.8125	6 1/8	51	3/8	3/8	1 1/8	2 1/4	2 1/2	1	1 3/16
"	9.98	16.46	51	1	1	2 1/2	5 1/2	6	1	2 15/16
"	13.91	24.96	51	1 1/2	1	2 1/2	5	10 1/4	1	1 5/16
"	16.156	28.312	51	1 3/4	1 3/8	3 1/2	7 3/2	10 1/4	1	2 3/16
"	23.971	42.693	51	2.63	2	5 5/8	9 1/4	10 3/4	1	
"	24 1/4	42 1/16	51	2.63	2	4 3/8	9 13/16	10	1	
52 to 1	42.49	74.48	52	4 1/2	2 3/8	6	12	12 3/4	1	4
53 to 1	17.78	28 15/32	53	1 1/16	1 1/8	3 3/4	9 1/2	7	1	
"	25 3/32	44.36	53	2.63	2	4 3/8	9 13/16	10	1	
"	30.70	54 5/16	53	3 1/4	2 3/8	7	12 1/16	13 1/2	1	
54 to 1	16.988	29.976	54	1 3/4	1 3/8	3 1/2	7 3/2	10 1/4	1	2 3/16
"	19.329	34.456	54	2	1 1/2	4	7	10	1	2 3/16
"	20.29	35.609	54	2.06	1 1/2	4 1/2	8 1/16	9	1	
55 to 1	17.42	30.76	55	1 3/4	1 1/2	3 3/4	7 3/2	9	1	2 3/16
56 to 1	15.24	27.41	56	1 1/2	1	2 1/2	5	10 1/4	1	1 5/16
"	26.046	44.587	56	2 1/2	1 3/8	3	6	6	2	"
"	32.25	57 15/16	56	3 1/4	2 3/4	7	12 1/16	13 1/2	1	
57 to 1	4.176	6.849	57	3/8	3/8	1 1/8	2 1/4	2 1/2	1	1 3/16
"	20.187	36.375	57	2	1 1/2	4	7	10	1	2 3/16
"	35.388	62.902	57	3 1/2	3	6 1/2	13 3/8	15	1	
58 to 1			58							
59 to 1	18.5	33.0	59	1 3/4	1 1/2	3 3/4	7 3/2	9	1	2 3/16
"	36.5	65 1/8	59	3 1/2	3	6 1/2	13 3/8	15	1	
60 to 1	11.174	19.098	60	1	7/8	3	5	8 1/4	1	
"	13.783	23.872	60	1 1/4	1 1/16	3 1/4	6 3/16	10 1/4	1	







## STRAIGHT AND HINDLEY-ALBRO WORM GEARING.

RATIO	C TO C	WORMWHEEL.					WORM.			
		A"	N	B"	H"	F"	D"	E"	S	G"
60 to 1	21.143	38.247	60	2	1½	4	7	10	1	3⅝
"	22.659	38.443	60	2	1¾	5	10⅜	10	1	4⅝
"	34.31	62.0625	60	3¼	2¾	7	12⅞	13½	1	
61 " 1	30.74	53.894	61	2¾	2⅞	6	12.35	15⅝	1	
"	37.595	67.316	61	3½	3	6½	13⅜	15	1	
62 " 1	19.38	34.67	62	1¾	1½	3¾	7⅝	9	1	2⅝
"	28.43	49.362	62	2½	1¾	7	9	13	1	3¼
63 " 1	23.625	40.375	63	2	1¾	5	10⅝	10	1	4⅝
64 " 1	11.8125	20.375	64	1	¾	3	5	8⅝	1	
"	14.8⅝	25.1⅝	64	1¼	1¾	3¼	6⅝	10¼	1	
65 " 1	32.49	56.896	65	2¾	2⅞	6	12.35	15⅝	1	
66 " 1	24.581	42.288	66	2	1¾	5	10⅝	10	1	4⅝
67 " 1	12.288	21.326	67	1	7/8	3	5	8¼	1	
68 " 1	15.574	27.055	68	1¼	1¾	3¼	6⅝	10¼	1	
"	33.80	59.522	68	2¾	2⅞	6	12.35	15⅝	1	
69 " 1			69						1	
70 " 1	12.86	22.9⅝	70	1	.68	2¼	3.445	6	1	
"	21.60	39.20	70	1¾	1	3½	7⅝	10¼	1	
71 " 1			71						1	
72 " 1			72						1	
73 " 1			73						1	
74 " 1	13½	23.554	74	1	.68	2¼	3.445	6	1	
75 " 1	22.72	42.	75	1¾	7/8	3	5⅝	8¼	1	
76 " 1	21.24	36.48	76	1¾	1	4¼	8¾	10¼	1	
77 " 1			77						1	
78 " 1	14.13	24.5⅝	78	1	.68	2¼	3.445	6	1	
79 " 1			79						1	
80 " 1	20.91	39.60	80	1⅝	7/8	4½	9½	8¼	1	
90 " 1			90						1	
100 " 1			100						1	
200 " 1			200						1	
270 " 1	33⅝	64.8⅝	270	¾	.46	2.1	3.52	3½	1	
279 " 1	35	66⅝	279	¾	.46	2.1	3.52	3½	1	
290 " 1	36⅝	69.1⅝	290	¾	.46	2.1	3.52	3½	1	
300 " 1			300						1	

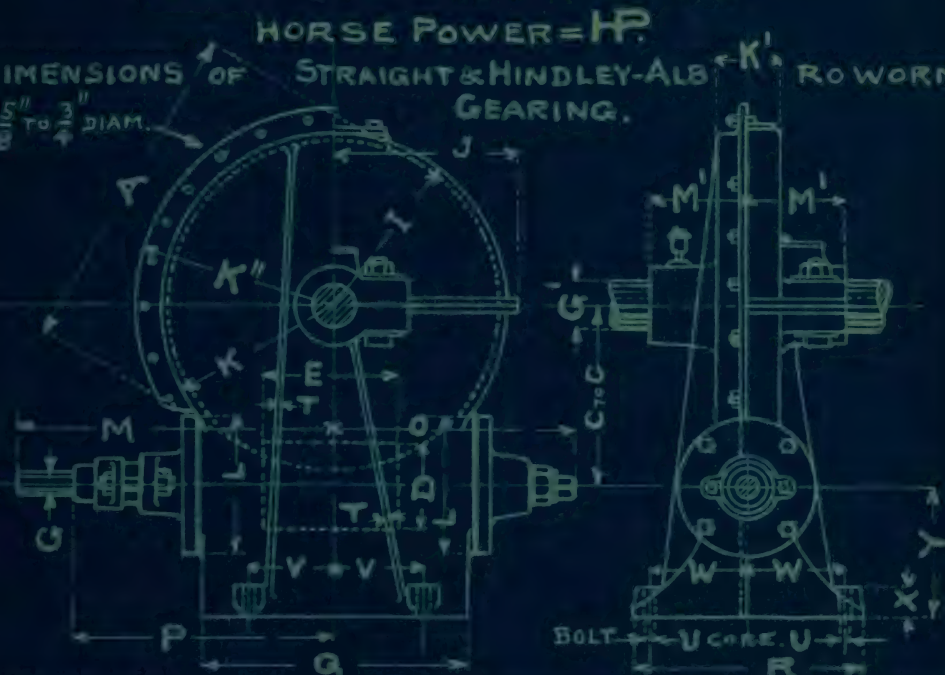


# WORMGEARING AND CASING FOR ELECTRIC HOISTS.

HORSE POWER =  $HP$ .

SEE DIMENSIONS OF STRAIGHT &amp; HINDLEY-ALB RO WORM-GEARING.

SKETCH SHOWS TWO WAYS OF CONSTRUCTION.



HP	RATIO	A	N	B	D	E	G	G'	I	J	K	K'	K''	L
7½	64 to 1	20.375	64	1	5	8½	1½	2½	11½	11½	11½	4¾	13½	9½
	46 " 1	20.187	46	1¾	5½	8½								
	31½ " 1	20.125	63	2	5½	8½								
15	47 to 1	26.187	47	1¾	6¾	10¾	1½	2½	14½	14½	14½	4¾	16½	9½
	29¾ " 1	26.3	59	2¾	6¾	10¾								
25	51 to 1	28.312	51	1¾	7¾	10¾	2¾	3¾	15½	16½	16	5¼	18½	11
	29¾ " 1	28.171	59	3	7¾	10¾								
	22½ " 1	28.812	45	4	7	10¾								
50	63 to 1	40.375	63	2	10¾	10	2½	3½	22¼	23	22½	7½	25	15
	31½ " 1	40.3¾	63	4	10¾	10								

HP	C to C'	M	M'	O	P	Q	R	T	U	V	W	X	Y
7½	11½	20½	6½	15	16¾	17¾	15¼	½	¾	5¾	6½	2¼	8¾
15	14½	23¾	7	16	17¾	19½	16	5/8	¾	6	6¾	3¼	9
25	16½	25½	7¼	17	19½	23	16	¾	¾	7½	6¾	3½	9
50	23½	29¾	10¼	22	24	31½	22¼	1	1¼	10	9½	4½	13







# MANILA ROPE TRANSMISSION.

MANILA TRANSMISSION ROPES ARE MADE FROM THE FIBERS OF THE ABACA PLANT LEAVES; THE FIBERS ARE 6 TO 12 FEET LONG, BEARING A TENSILE STRAIN OF 50000 LBS. PER SQ. INCH, WHICH IS GREATLY REDUCED BY TWISTS OF THE YARN AND STRANDS IN THE ROPE.

THREE STRAND ROPE. FOUR STRAND ROPE. SIX STRAND ROPE.



LAID UP IN TALLOW, PLUMBAGO OR OTHER LUBRICANT TO MAKE THE ROPE WATER PROOF.

## DIMENSIONS OF ROPES AND DRIVING.

DIAM. OF ROPE.	AREA OF ROPE.	SQUARE OF DIAM.	APP. WGT. PER FT.	BREAKING STRENGTH.	MAXIMUM ALLOWABLE TENSION.	FOR SPLICING ALLOW LENGTH IN FEET.			SMALLEST DIAM. OF SHEAVES. INCHES.	MAX. NUMBER OF REVOLUTIONS. MIN. UTE AT 5400 FT. MIN. VELOCITY.
						3 STRANDS	4 STRANDS	6 STRANDS		
INCH.   M.M.	SQ. INCH	SQ. IN.		POUNDS.						
3/4	19	.4418	.3625	.20	3950	112	6	8	27	760
7/8	22.2	.6013	.7656	.26	5400	153	6	8	32	650
1	25.4	.7854	1.000	.34	7000	200	7	10	36	570
1 1/8	28.5	.9940	1.2656	.43	8900	253	7	10	40	510
1 1/4	31.7	1.2272	1.5625	.53	10900	312	7	10	45	460
1 1/2	38	1.7671	2.25	.77	16700	450	8	12	54	380
1 3/4	44.5	2.4053	3.0625	1.04	21400	612	8	12	63	330
2	50.8	3.1416	4.000	1.36	28000	800	9	14	72	290
2 1/4	57	3.9761	5.0625	1.73	35400	1012	9	14	81	255
2 1/2	63.5	4.9087	6.25	2.13	43700	1250	10	16	90	230

SLACK SIDE.



$T'$  = TENSION ON SLACKS.

$S$  = SAG ON DRIVING SIDE.

$S'$  = " " SLACK " "

$D$  = DIAM. OF SHEAVES.

$T$  = TENSION ON DRIVING S.

## HORSE POWER OF M. POPE.

DIAMETER ROPE.	VELOCITY. FEET PER MINUTE.												
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000
$\frac{3}{4}$	1.1	2.3	3.3	4.3	5.2	6.0	6.6	7.2	7.3	7.4	7.3	6.9	5.1
$\frac{7}{8}$	1.5	3.0	4.5	5.9	7.0	8.2	9.0	9.6	9.8	10.0	9.6	9.0	6.5
1	2.0	4.0	5.9	7.7	9.2	10.6	11.3	12.7	12.9	13.0	12.7	12.0	8.3
$1\frac{1}{8}$	2.5	5.0	7.5	9.7	11.6	13.5	14.9	16.0	16.3	16.7	16.5	15.3	10.2
$1\frac{1}{4}$	3.1	6.3	9.1	12.0	14.3	16.7	18.5	20.0	20.2	20.7	20.1	18.9	13.5
$1\frac{1}{2}$	4.5	9.0	13.5	17.4	20.7	23.0	26.3	28.7	29.0	29.5	28.6	26.7	17.6
$1\frac{3}{4}$	6.1	12.3	18.0	23.6	28.2	32.7	36.4	38.5	39.4	40.5	38.7	36.0	23.2
2	8.0	16.0	23.2	30.6	36.3	42.5	46.7	50.0	51.7	52.8	50.6	47.3	32.6
$2\frac{1}{4}$	10.0	20.0	29.6	38.6	46.6	53.6	59.2	63.6	65.3	66.3	64.4	60.3	42.3
$2\frac{1}{2}$	12.2	25.0	36.6	47.7	57.5	66.0	71.2	78.0	80.0	81.0	79.0	73.8	52.0

## SAG OF MANILA ROPE.

DISTANCE BETW. SHEAVES FEET.	SAG ON DRIVING SIDE ALL SPEEDS. FEET	SAG ON SLACK SIDE. FEET.				
		VELOCITY. FEET PER MINUTE.				
		3000	4000	4500	5000	5500
30	.19	.45	.39	.36	.33	.30
40	.34	.80	.69	.64	.59	.53
50	.53	1.2	1.1	1.0	.92	.84
60	.76	1.8	1.7	1.4	1.3	1.2
70	1.0	2.4	2.1	1.9	1.7	1.6
80	1.4	3.2	2.9	2.5	2.3	2.1
90	1.7	4.0	3.5	3.2	3.0	2.7
100	2.1	5.0	4.3	4.0	3.7	3.3
120	3.0	7.2	6.2	5.7	5.3	4.8
140	4.1	9.9	8.5	7.8	7.2	6.6
160	5.4	12.9	11.1	10.2	9.5	8.6

LENGTH OF ROPES IN COILS ARE 500, 750, 850, 1000 & 1200 Ft.

## SYSTEMS OF ROPE DRIVING.

1. MULTIPLE OR ENGLISH SYSTEM ADAPTABLE TO TRANSMIT LARGE POWERS; CONSISTING OF ONE OR MORE INDEPENDENT ROPES, RUNNING SIDE BY SIDE IN THE GROOVES OF THE SHEAVES. PARALLEL SHAFTS AND SUFFICIENTLY OFF THE VERTICAL PREVENT ROPES FROM LEAVING THE GROOVES OF THE LOWER SHEAVE WHEN SLACK.

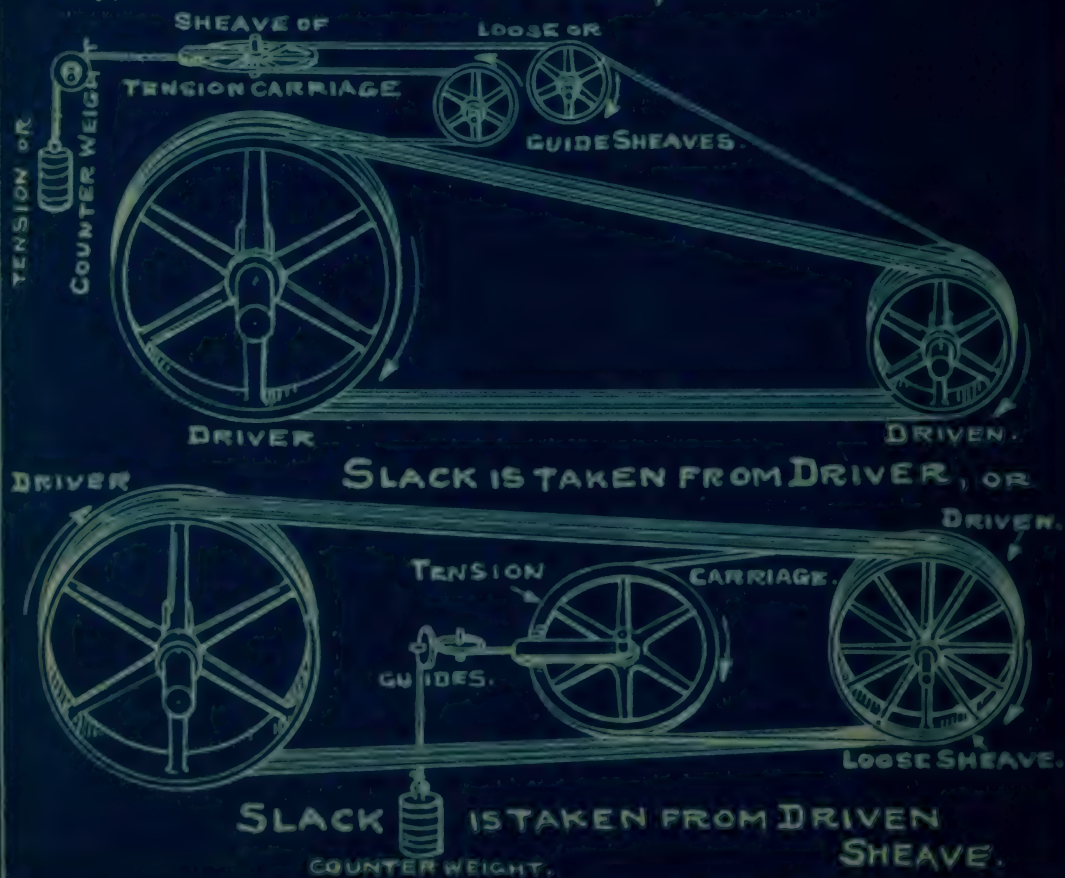




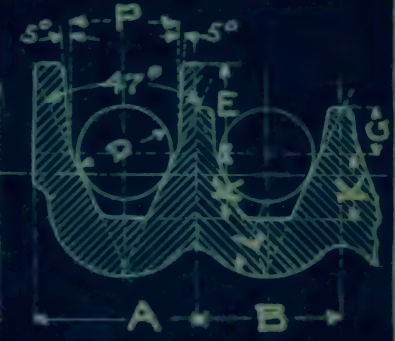
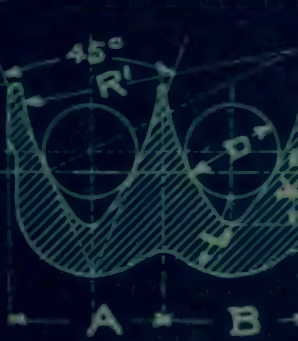
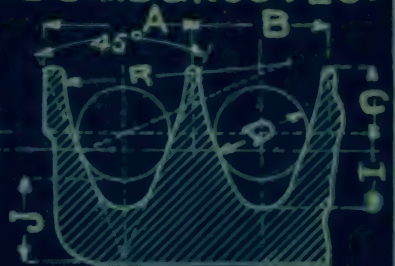
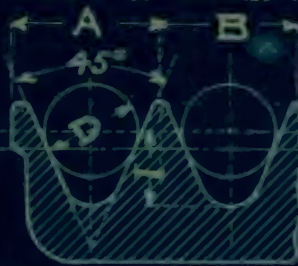
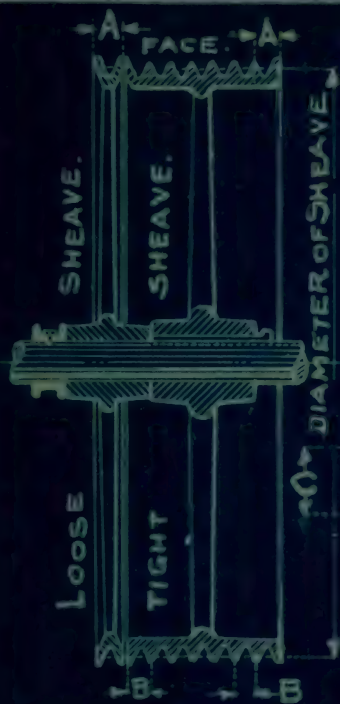




**2. CONTINUOUS OR AMERICAN SYSTEM IN WHICH ONE ROPE IS WOUND AROUND ONE OR MORE TIMES THE DRIVING AND DRIVEN SHEAVES. THE ROPE IS CONDUCTED, ON THE SLACK SIDE, FROM AN OUTSIDE GROOVE OF THE DELIVERING LOOSE SHEAVE, - TO THE OPPOSITE OUTSIDE GROOVE OF THE RECEIVING SHEAVE BY A COUNTERWEIGHT BALANCED TRAVELING TENSION CARRIAGE OR JOCKEY, WHICH TRAVELING BACK AND FORTH REGULATES THE TENSION OF THE ROPE IN TAKING UP THE SLACK. THE SLACK ACCUMULATES JUST OFF THE DRIVER SHEAVE ON THE SLACK SIDE, WHERE :**



# DIMENSIONS OF ROPE SHEAVES AND GROOVES.

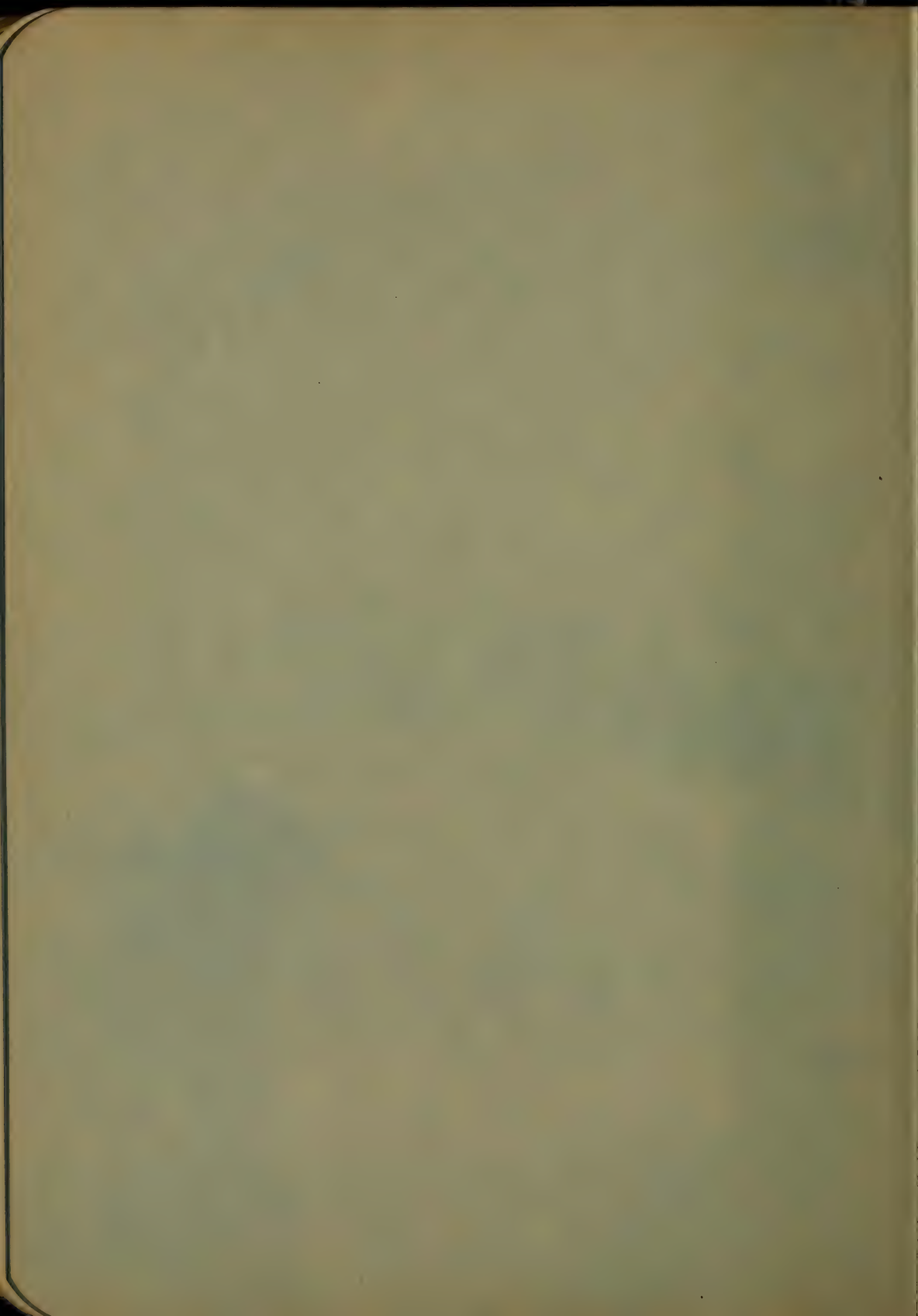


SHEAVES ARE CAST PLAIN OR IN HALVES FROM 18", 20", 22", 24", 26" TO 120" IN DIAMETER WITH 16, 18, 19, 20, 25..... 25 GROOVES IN NUMBER AND ALSO FITTED WITH FRICTION CLUTCHES IF NEEDED.

D	3/4"	7/8"	1"	1 1/8"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"
A	1 1/4	1 1/2	1 5/8	1 7/8	2	2 3/8	2 3/4	3 1/8	3 1/2	4
B	1 1/8	1 5/16	1 1/2	1 11/16	1 13/16	2 1/16	2 9/16	2 3/8	3 1/8	4 1/2
C	9/16	21/32	3/4	2 7/32	1 11/16	1 1/8	1 15/16	1 1/2	1 11/16	1 7/8
D	7/8	1	1 1/8	1 1/4	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 5/8
E	11/16	25/32	7/8	21/32	1 1/16	1 1/4	1 7/16	1 5/8	1 13/16	2
F	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 7/8	2 1/8
G	13/32	15/32	17/32	19/32	3/8	7/16	1/2	5/8	3/4	7/8
H	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
I	9/16	21/32	3/4	7/8	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2
J	11/16	13/16	1 5/16	1 1/16	1 3/16	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4
K	17/32	5/8	3/4	13/16	7/8	1	1 1/8	1 1/4	1 7/16	1 5/8
L	5/8	3/4	7/8	1	1 1/16	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8
M	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8
N	3/16	1/4	5/16	5/16	5/16	3/8	1/2	5/8	5/8	5/8
P	7/8	1	1 1/8	1 1/4	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 5/8
R	1 1/2	1 3/4	2	2 1/4	2 1/2	3	3 1/2	4	4 1/2	5
R	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/2	5 1/4	6	6 3/4	7 1/2

FOR HUBS AND ARMS SEE CAST IRON PULLEYS PAGE 130 TO 132.







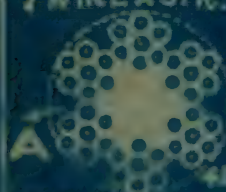
# WIRE ROPE TRANSMISSION.

WIRE HOISTING AND TRANSMISSION ROPES ARE MADE OF IRON, OPEN-HEARTH - CRUCIBLE AND PLOUGH STEEL, IN SOME CASES OF COPPER, BRONZE, ETC. WIRES EITHER TWISTED TOGETHER OR LAID PARALLEL TO EACH OTHER. THERE ARE: **FLAT WIRE ROPES** CONSISTING OF A NUMBER OF WIRE STRANDS LAID SIDE BY SIDE AND SEWED TOGETHER WITH ANNEALED WIRE. **ROUND WIRE ROPES** CONSIST OF A NUMBER OF WIRE STRANDS TWISTED IN RIGHT LAY OR LEFT LAY AROUND A TARED HEMP CORE, WIRE CORE OR A WIRE STRAND.

SHORT TWISTS MAKE THE ROPE FLEXIBLE, LONG TWISTS RIGID.

COMMONLY 4, 7, 12, 19 AND 37 WIRES ARE TWISTED TOGETHER FOR A STRAND, AND 6 SUCH STRANDS ARE TWISTED AROUND A CORE FOR THE ROPE.

7 WIRE A STR.



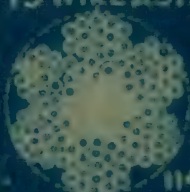
HEMP CORE. 7 WIRE STRAND CORE.

SIX STRANDS ROPE OF 7 WIRE A STR.



49 WIRES.

19 WIRE A STR.



HEMP CORE. 5, WIRES.

512 STRANDS 7 WIRE A STRAND.



**STANDARD HOISTING ROPE.** COMPOSED OF 6 STRANDS AND A HEMP CORE, 19 WIRES TO THE STRAND. MADE OF: SWEDISH IRON AND CAST STEEL, STRENGTH RANGES FROM 45000 TO 100000 AND FROM 50000 TO 130000 LBS. PER SQ. INCH.

**TRANSMISSION OR HAULAGE ROPE.** COMPOSED OF 6 STRANDS AND A HEMP CORE, 7 WIRES TO THE STRAND. MADE OF: SWEDISH IRON AND CAST STEEL.

THE ABOVE ROPES ARE ALSO MADE OF CRUCIBLE CAST STEEL 130000 TO 190000 LBS. PER SQ. INCH. AND OF PLOUGH STEEL 190000 TO 350000 LBS. PER SQ. INCH. TO REDUCE WEIGHT IN LONG DRIVES.

**TILLER ROPE.** EXTREMELY FLEXIBLE COMPOSED OF SIX ROPES OF SIX STRANDS AND HEMP CORES AND OF 7 WIRES TO THE STRANDS.

**STEEL HAWSERS** COMPOSED OF SIX ROPES EACH CONSISTING SIX STRANDS AND A HEMP CORE, 12 OR 37 WIRES TO THE STRAND.

**CAST STEEL FLAT ROPES.**  $\frac{3}{8}$ " TO  $\frac{1}{2}$ " THICK AND 2" TO 7" WIDE.

WIRES ARE GALVANIZED OR TINNED AGAINST SALT AIR, RUST, ETC.





# SAG. DIMENSIONS OF ROPES AND DRIVES.

SHEAVES APART FT.	40	50	60	75	100	125	150	175	200	225	250	275	300	350	400
DEFLECTION R IN FEET.	1.052	1.315	1.579	1.973	2.631	3.289	3.947	4.605	5.263	5.921	6.579	7.236	7.894	9.21	10.53
SAG ON DRIVING SIDE "	1.538	1.923	2.307	2.824	3.846	4.807	5.769	6.73	7.692	8.653	9.615	10.58	11.54	12.96	14.38
SAG ON SLACK SIDE "	.768	.963	1.153	1.442	1.841	2.314	2.777	3.25	3.703	4.166	4.629	5	5.457	6.25	6.88

## HOISTING AND TRANSMISSION ROPES.

ROPE 1		6 STRANDS & HEMP CORE. 10 WIRES A STR.					6 STRANDS & HEMP CORE. 7 WIRES.														
MATERIAL:		SWEDISH IRON					CAST STEEL					SWEDISH IRON					CAST STEEL				
DIAM. OF ROPE. INCH.	WEIGHT PER 100 FT. LBS.	WORKING.		BREAKING.		MIN. DIA. OF DRUM & SHEAVE.	WORKING.		BREAKING.		MIN. DIA. OF DRUM & SHEAVE.	WORKING.		BREAKING.		MIN. DIA. OF DRUM & SHEAVE.	WORKING.		BREAKING.		MIN. DIA. OF DRUM & SHEAVE.
		TONS.	FEET.	TONS.	FEET.		TONS.	FEET.	TONS.	FEET.		TONS.	FEET.	TONS.	FEET.		TONS.	FEET.	TONS.	FEET.	
1/4	6.3	2.4	1/2	3.7	54	3	1.6	5/8	1.4	.28	2 1/4	2.8	3.4	5.6	3.22	6.4	3.68	7.3	15.1	1 1/2	
5/16	7.2	3.4	5/8	4.05	81	4.5	.9	7/8	1.7	.34	2 1/2	3.4	4.5	6.8	3.48	7.7	4.35	8.7	15 1/2	1 3/4	
3/8	9.5	5.0	1	5.8	115	6.05	1.31	1 1/2	2.4	.48	3 1/4	4.5	6.05	9.6	5.08	1.1	6.35	12.7	2 1/2	2	
7/16	11	6.8	1 1/4	7.8	156	8.05	1.77	2	3.3	.66	3 3/4	6.5	8.05	13.2	7.5	1.5	8.65	17.1	3 1/2	2 1/2	
1/2	12.7	8.8	1 3/4	10.1	202	11.4	2.28	2 1/2	4.2	.84	4	8.4	10.6	16.8	9.7	1.94	11	22	4	3	
9/16	14.3	11	2	12.7	254	14.5	2.9	3	5.3	1.06	4 1/2	10.6	13.2	21.2	12.3	2.46	14	28	5	3 1/2	
5/8	15.8	13.6	2 1/4	15.8	316	18	3.6	3 1/2	6.6	1.32	5	15.8	19.2	28.6	15.4	3.02	17	34	6	4	
11/16	17.5	19.4	3	22	44	25	5	4	9.3	1.57	6 1/2	18.6	22.4	33.7	18.4	4.2	24	48	8	4 1/2	
3/4	19	26	3 1/2	30	60	34	6.8	4 1/2	12	2.4	7 1/2	24	28.4	48	28	5.6	32	64	10	5	
7/8	22.2	34	4	39	78	44	8.8	5	16	3.2	8 1/2	32	38	64	37	7.4	42	84	12	5 1/2	
1	25.4	42	5	49	98	56	11.2	5 1/2	20	4.2	9 1/2	40	48	80	46	9.2	53	106	15	6	
1 1/8	28.5	50	6 1/4	58	116	67	13.4	6	24	5.0	10 1/2	48	58	96	56	11.2	64	128	18	6 1/2	
1 1/4	31.7	62	7 1/4	72	144	82	16.4	6 1/2	28	6.0	12	56	68	112	68	13.6	78	156	20	7	
1 3/8	38	72	8 1/4	84	168	96	19.2	7	34	7.2	14 1/2	68	84	136	84	15.8	91	182	25	8	
1 1/2	41.3	84	9 1/4	97	194	111	22.2	7 1/2	40	8.4	16 1/2	80	97	156	97	18.4	106	212	30	9	
1 5/8	44.5	96	10 1/4	112	224	128	25.6	8	48	9.6	18 1/2	96	112	184	112	20.8	128	256	35	10	
1 3/4	47.7	108	11 1/4	124	248	145	28.8	8 1/2	56	10.8	20 1/2	112	136	208	128	23.2	144	288	40	11	





HORSE POWER OF WIRE ROPE DRIVES.

PRACTICAL ROPE VELOCITY: 2000, 2250, 2500, 2750, 3000, 3500, 4000 feet/min.

DISTANCE IN FEET.								DISTANCE IN FEET.								DISTANCE IN FEET.								DISTANCE IN FEET.																							
100				150				200				250				300				350				100				150				200				250				300				350			
REVOLUTION PER MINUTE.								REVOLUTION PER MINUTE.								REVOLUTION PER MINUTE.								REVOLUTION PER MINUTE.																							
2	3	4	5	6	8	10	12	2	3	4	5	6	8	10	12	2	3	4	5	6	8	10	12	2	3	4	5	6	8	10	12	2	3	4	5	6	8	10	12								
180	160	150	140	130	120	110	100	180	160	150	140	130	120	110	100	180	160	150	140	130	120	110	100	180	160	150	140	130	120	110	100	180	160	150	140	130	120	110	100								
80	75	70	65	60	55	50	45	80	75	70	65	60	55	50	45	80	75	70	65	60	55	50	45	80	75	70	65	60	55	50	45	80	75	70	65	60	55	50	45								
4	5	6	8	10	12	15	20	4	5	6	8	10	12	15	20	4	5	6	8	10	12	15	20	4	5	6	8	10	12	15	20	4	5	6	8	10	12	15	20								
124	112	100	90	80	70	60	50	124	112	100	90	80	70	60	50	124	112	100	90	80	70	60	50	124	112	100	90	80	70	60	50	124	112	100	90	80	70	60	50								
93	84	74	66	58	50	42	34	93	84	74	66	58	50	42	34	93	84	74	66	58	50	42	34	93	84	74	66	58	50	42	34	93	84	74	66	58	50	42	34								
65	56	47	40	34	28	22	16	65	56	47	40	34	28	22	16	65	56	47	40	34	28	22	16	65	56	47	40	34	28	22	16	65	56	47	40	34	28	22	16								
35	30	25	20	16	12	9	6	35	30	25	20	16	12	9	6	35	30	25	20	16	12	9	6	35	30	25	20	16	12	9	6	35	30	25	20	16	12	9	6								
129	115	102	90	80	70	60	50	129	115	102	90	80	70	60	50	129	115	102	90	80	70	60	50	129	115	102	90	80	70	60	50	129	115	102	90	80	70	60	50								
45	39	33	27	22	18	14	10	45	39	33	27	22	18	14	10	45	39	33	27	22	18	14	10	45	39	33	27	22	18	14	10	45	39	33	27	22	18	14	10								
143	127	112	98	85	73	62	51	143	127	112	98	85	73	62	51	143	127	112	98	85	73	62	51	143	127	112	98	85	73	62	51	143	127	112	98	85	73	62	51								
51	44	37	30	24	19	15	11	51	44	37	30	24	19	15	11	51	44	37	30	24	19	15	11	51	44	37	30	24	19	15	11	51	44	37	30	24	19	15	11								
153	136	120	105	92	80	69	58	153	136	120	105	92	80	69	58	153	136	120	105	92	80	69	58	153	136	120	105	92	80	69	58	153	136	120	105	92	80	69	58								
62	54	46	38	31	25	20	15	62	54	46	38	31	25	20	15	62	54	46	38	31	25	20	15	62	54	46	38	31	25	20	15	62	54	46	38	31	25	20	15								
95	82	70	60	51	43	35	27	95	82	70	60	51	43	35	27	95	82	70	60	51	43	35	27	95	82	70	60	51	43	35	27	95	82	70	60	51	43	35	27								
105	92	80	69	59	50	42	34	105	92	80	69	59	50	42	34	105	92	80	69	59	50	42	34	105	92	80	69	59	50	42	34	105	92	80	69	59	50	42	34								
120	106	93	81	71	62	53	44	120	106	93	81	71	62	53	44	120	106	93	81	71	62	53	44	120	106	93	81	71	62	53	44	120	106	93	81	71	62	53	44								
132	116	102	89	77	66	56	46	132	116	102	89	77	66	56	46	132	116	102	89	77	66	56	46	132	116	102	89	77	66	56	46	132	116	102	89	77	66	56	46								
140	124	109	95	83	72	61	51	140	124	109	95	83	72	61	51	140	124	109	95	83	72	61	51	140	124	109	95	83	72	61	51	140	124	109	95	83	72	61	51								
150	132	116	102	89	77	65	54	150	132	116	102	89	77	65	54	150	132	116	102	89	77	65	54	150	132	116	102	89	77	65	54	150	132	116	102	89	77	65	54								
160	140	123	108	94	81	69	57	160	140	123	108	94	81	69	57	160	140	123	108	94	81	69	57	160	140	123	108	94	81	69	57	160	140	123	108	94	81	69	57								
170	149	130	114	100	86	73	61	170	149	130	114	100	86	73	61	170	149	130	114	100	86	73	61	170	149	130	114	100	86	73	61	170	149	130	114	100	86	73	61								
180	158	137	120	105	91	77	64	180	158	137	120	105	91	77	64	180	158	137	120	105	91	77	64	180	158	137	120	105	91	77	64	180	158	137	120	105	91	77	64								
190	166	144	126	110	95	80	66	190	166	144	126	110	95	80	66	190	166	144	126	110	95	80	66	190	166	144	126	110	95	80	66	190	166	144	126	110	95	80	66								
200	174	150	131	114	98	82	68	200	174	150	131	114	98	82	68	200	174	150	131	114	98	82	68	200	174	150	131	114	98	82	68	200	174	150	131	114	98	82	68								
210	182	156	136	118	101	84	70	210	182	156	136	118	101	84	70	210	182	156	136	118	101	84	70	210	182	156	136	118	101	84	70	210	182	156	136	118	101	84	70								
220	190	163	142	123	104	86	72	220	190	163	142	123	104	86	72	220	190	163	142	123	104	86	72	220	190	163	142	123	104	86	72	220	190	163	142	123	104	86	72								
230	197	169	147	127	107	88	74	230	197	169	147	127	107	88	74	230	197	169	147	127	107	88	74	230	197	169	147	127	107	88	74	230	197	169	147	127	107	88	74								
240	204	175	152	131	111	91	76	240	204	175	152	131	111	91	76	240	204	175	152	131	111	91	76	240	204	175	152	131	111	91	76	240	204	175	152	131	111	91	76								
250	211	181	157	135	114	93	78	250	211	181	157	135	114	93	78	250	211	181	157	135	114	93	78	250	211	181	157	135	114	93	78	250	211	181	157	135	114	93	78								
260	218	187	163	140	118	95	80	260	218	187	163	140	118	95	80	260	218	187	163	140	118	95	80	260	218	187	163	140	118	95	80	260	218	187	163	140	118	95	80								
270	225	193	168	144	121	97	82	270	225	193	168	144	121	97	82	270	225	193	168	144	121	97	82	270	225	193	168	144	121	97	82	270	225	193	168	144	121	97	82								
280	231	199	173	148	124	99	84	280	231	199	173	148	124	99	84	280	231	199	173	148	124	99	84	280	231	199	173	148	124	99	84	280	231	199	173	148	124	99	84								
290	238	204	178	151	127	100	86	290	238	204	178	151	127	100	86	290	238	204	178	151	127	100	86	290	238	204	178	151	127	100	86	290	238	204	178	151	127	100	86								
300	244	209	183	155	130	102	88	300	244	209	183	155	130	102	88	300	244	209	183	155	130	102	88	300	244	209	183	155	130	102	88	300	244	209	183	155	130	102	88								
310	250	214	187	158	133	104	90	310	250	214	187	158	133	104	90	310	250	214	187	158	133	104	90	310	250	214	187	158	133	104	90	310	250	214	187	158	133	104	90								
320	256	219	191	161	136	106	92	320	256	219	191	161	136	106	92	320	256	219	191	161	136	106	92	320	256	219	191	161	136	106	92	320	256	219	191	161	136	106	92								
330	262	224	195	164	138	108	94	330	262	224	195	164	138	108	94	330	262	224	195	164	138	108	94	330	262	224	195	164	138	108	94	330	262	224	195	164	138	108	94								
340	268	229	199	167	140	110	96	340	268	229	199	167	140	110	96	340	268	229	199	167	140	110	96	340	268	229	199	167	140	110	96	340	268	229	199	167	140	110	96								
350	274	234	203	170	142	112	98	350	274	234	203	170	142	112	98	350	274	234	203	170	142	112	98	350	274	234	203	170	142	112	98	350	274	234	203	170	142	112	98								
360	280	239	207	173	144	114																																									





# STRAIN ON WIRE ROPE USED ON SLOPES OR INCLINED PLANES.

STRAIN IN POUNDS ON ROPE DUE TO A LOAD OF ONE  
TON OF 2000 LBS. 6 STRANDS & HEMP CORE, 7 WIRES USED.

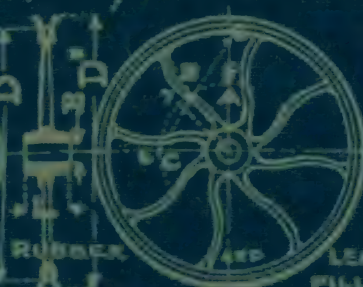
ELEVATION IN 100 FEET.	CORRESPOND- ING ANGLE OF INCLINATION.	STRAIN IN LBS. ON ROPE FROM A LOAD OF ONE TON	ELEVATION IN 100 FEET.	CORRESPOND- ING ANGLE OF INCLINATION.	STRAIN IN LBS. DUE TO LOAD OF ONE TON OF ROPE.	ELEVATION IN 100 FEET.	CORRESPOND- ING ANGLE OF INCLINATION.	STRAIN IN LBS. DUE TO LOAD OF ONE TON.	ELEVATION IN 100 FEET.	CORRESPOND- ING ANGLE OF INCLINATION.	STRAIN IN LBS. DUE TO LOAD OF ONE TON.
5	8 5/8°	112	50	26 1/2°	985	95	43 1/2°	1385	140	54 1/2°	1633
10	5 1/2°	211	55	28 3/4°	975	100	45°	1419	145	55 1/2°	1653
15	8 1/8°	303	60	31°	1040	105	46 1/2°	1457	150	56 1/2°	1671
20	11 1/8°	404	65	33 1/2°	1100	110	47 3/4°	1487	155	57 1/2°	1689
25	14 1/8°	497	70	35°	1156	115	49°	1516	160	58°	1703
30	16 3/4°	586	75	37°	1210	120	50 1/2°	1544	165	58 1/2°	1717
35	19 1/8°	673	80	38 1/2°	1260	125	51 1/2°	1570	170	59 1/2°	1729
40	21 1/2°	754	85	40°	1304	130	52 1/2°	1592	175	60 1/2°	1742
45	24°	832	90	42°	1347	135	53 1/2°	1614	180		

## DIMENSIONS OF WIRE ROPE SHEAVES.

SHEAVE WITH STRAIGHT ARMS, CURVED ARMS, RIBBED ARMS.



SOLID IRON  
SHEAVE.



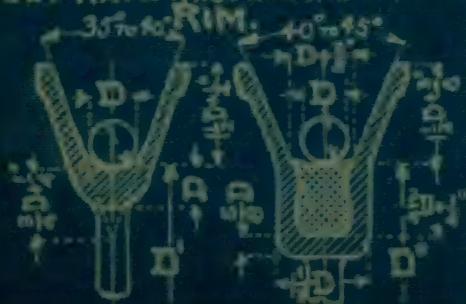
LEATHER  
FILLING.



HEAVY IRON SHEAVE  
WITH WOODEN FILLING.

FOR ARM AND HUBS SEE PAGES  
130 + 132 AND 140.

SHEAVES ABOVE 10 FEET ARE  
CAST IN HALVES AND ABOVE 12  
FEET HAVE WROUGHT IRON ARMS.



DIAM. OF ROPE	FEET.		INCHES.		SPEED IN FEET PER MIN.	WT. OF ARMS
	D'	D	L	B		
1/2" - 3/4"	1	1 1/2	1 1/4	1	314	4
3/4" - 1"	1 1/2	1 5/8	2	1 1/8	471	5
1" - 1 1/4"	2	2 1/2	3	1 5/16	628	6
1 1/4" - 1 1/2"	2 1/2	2 3/4	4	1 3/8	786	6
1 1/2" - 1 3/4"	3	3 1/4	5	2 1/16	942	6
1 3/4" - 2"	4	4 1/2	7	2 7/16	1266	6
2" - 2 1/4"	5	5 1/2	8	2 1/2	1571	7
2 1/4" - 2 1/2"	6	6 1/4	9	3 1/16	1885	7
2 1/2" - 2 3/4"	7	7 1/2	10	3 1/2	2199	8
2 3/4" - 3"	8	8 1/4	12	4 1/16	2513	8
3" - 3 1/4"	9	9 1/2	14	4 1/2	2827	10
3 1/4" - 3 1/2"	10	10 1/2	15	5 1/16	3141	10
3 1/2" - 3 3/4"	11	11 1/2	16	5 1/4	3455	12
3 3/4" - 4"	12	12 1/2	16	6 1/16	3770	14







# PROPERTIES OF

THE COEFFICIENT OF STRENGTH FOR A  
TWICE THAT FOR THE SAME LOAD UNIT.

SECTION NUMBER		DEPTH OF BEAM, INCH.	WEIGHT PER FOOT IN LBS.	AREA OF SECTION, SQ. INCHES.	THICKNESS OF WEB, INCHES.	WIDTH OF FLANGE, INCHES.	MOMENT OF INERTIA, AXIS 1-1, INCH. <sup>4</sup>	SECTION MOD., AXIS 1-1, INCH. <sup>3</sup>	RADIUS OF GYRATION, AXIS 1-1, INCH.	MOMENT OF INERTIA, AXIS 2-2, INCH. <sup>4</sup>	RADIUS OF GYRATION, AXIS 2-2, INCH.	INCREASE OF WEIGHT FOR EACH LB. IN WEIGHT, INCH.
CAMBRIDGE STEEL CO.	CARNEGIE STEEL CO.											
B5	B77	3	5.5	1.63	.17	2.33	2.5	1.7	1.23	.46	.53	.098
B5	"	"	6.0	1.8	.2	2.26	2.6	1.74	1.21	.47	.51	.098
B5	"	"	6.5	1.91	.26	2.42	2.7	1.8	1.19	.53	.52	.098
B5	"	"	7.5	2.21	.36	2.52	2.9	1.9	1.15	.60	.52	.098
B9	B23	4	7	2.1	.17	2.39	5.7	2.85	1.66	.72	.59	.074
B9	"	"	7.5	2.21	.19	2.66	6.0	3.0	1.64	.77	.59	.074
B9	"	"	8.5	2.50	.26	2.73	6.4	3.2	1.59	.85	.58	.074
B9	"	"	9.5	2.79	.34	2.81	6.7	3.4	1.54	.93	.58	.074
B9	"	"	10.5	3.09	.41	2.88	7.1	3.6	1.52	1.01	.57	.074
B13	B21	5	9.75	2.87	.21	3.00	12.1	4.8	2.05	1.23	.65	.059
B13	"	"	10	3.0	.22	3.00	12.4	4.96	2.03	1.29	.66	.059
B13	"	"	12.25	3.60	.36	3.15	13.6	5.4	1.94	1.45	.63	.059
B13	"	"	14.75	4.34	.50	3.29	15.1	6.1	1.87	1.70	.63	.059
B17	B19	6	12.25	3.61	.23	3.33	21.8	7.3	2.46	1.85	.72	.049
B17	"	"	13	3.8	.23	3.5	23.5	7.83	2.48	2.27	.77	.049
B17	"	"	14.75	4.34	.35	3.45	24.0	8.0	2.35	2.09	.69	.049
B17	"	"	17.25	5.07	.47	3.57	26.2	8.7	2.27	2.36	.68	.049
B21	B17	7	15	4.42	.25	3.66	36.2	10.4	2.86	2.67	.78	.042
B21	"	"	17.5	5.15	.35	3.76	39.2	11.2	2.76	2.94	.76	.042
B21	"	"	20	5.88	.46	3.87	42.2	12.1	2.68	3.24	.74	.042
B25	B15	8	17.75	5.33	.27	4.00	56.9	14.2	3.27	3.78	.84	.037
B25	"	"	18	5.37	.28	4.25	57.8	14.4	3.30	4.35	.91	.037
B25	"	"	20.25	5.96	.35	4.08	60.2	15.0	3.18	4.04	.82	.037
B25	"	"	22.75	6.69	.44	4.17	64.1	16.0	3.10	4.36	.81	.037
B25	"	"	25.25	7.43	.53	4.26	68.0	17.0	3.03	4.71	.80	.037
B29	B13	9	21	6.31	.29	4.33	84.9	18.9	3.67	5.16	.90	.033
B29	"	"	26	7.35	.41	4.45	71.9	20.4	3.54	5.65	.88	.033
B29	"	"	30	8.32	.57	4.61	101.9	22.6	3.40	6.42	.85	.033
B29	"	"	35	10.29	.73	4.77	111.8	24.8	3.30	7.31	.84	.033
B33	B11	10	25	7.37	.31	4.66	122.1	24.4	4.07	6.89	.97	.029
B33	"	"	30	8.82	.45	4.80	134.2	26.8	3.90	7.65	.93	.029
B33	B10	"	33	9.7	.37	5	161.3	32.3	4.08	11.8	1.10	.029
B33	"	"	35	10.29	.60	4.95	146.4	29.3	3.77	8.62	.91	.029
B33	"	"	40	11.75	.75	5.10	158.7	31.7	3.67	9.50	.90	.029
B41	B9	12	31.5	9.26	.35	5.00	215.8	36.0	4.83	9.50	1.01	.025
B41	"	"	32	9.4	.35	5.25	222.3	37	4.85	10.3	1.04	.025
B41	"	"	36	10.29	.44	5.09	228.3	38.0	4.71	10.07	.99	.025
B41	B8	"	40	11.76	.56	5.21	245.9	41.0	4.57	10.95	.96	.025
B105	"	"	45	13.24	.58	5.37	285.7	47.6	4.65	14.89	1.06	.025
B105	"	"	50	14.71	.70	5.49	303.4	50.6	4.54	16.12	1.05	.025
B105	"	"	55	16.18	.82	5.61	321.0	53.6	4.45	17.46	1.04	.025
B53	B7	15	41	12.0	.40	5.50	424.1	56.6	5.94	14	1.08	.02
B53	"	"	42	12.48	.41	5.50	441.8	58.9	5.95	14.62	1.08	.02
B53	"	"	45	13.24	.46	5.55	455.8	60.8	5.87	15.09	1.07	.02

FOR BENDING MOMENTS, MAX. SHEAR AND MAX. DEFLECTION



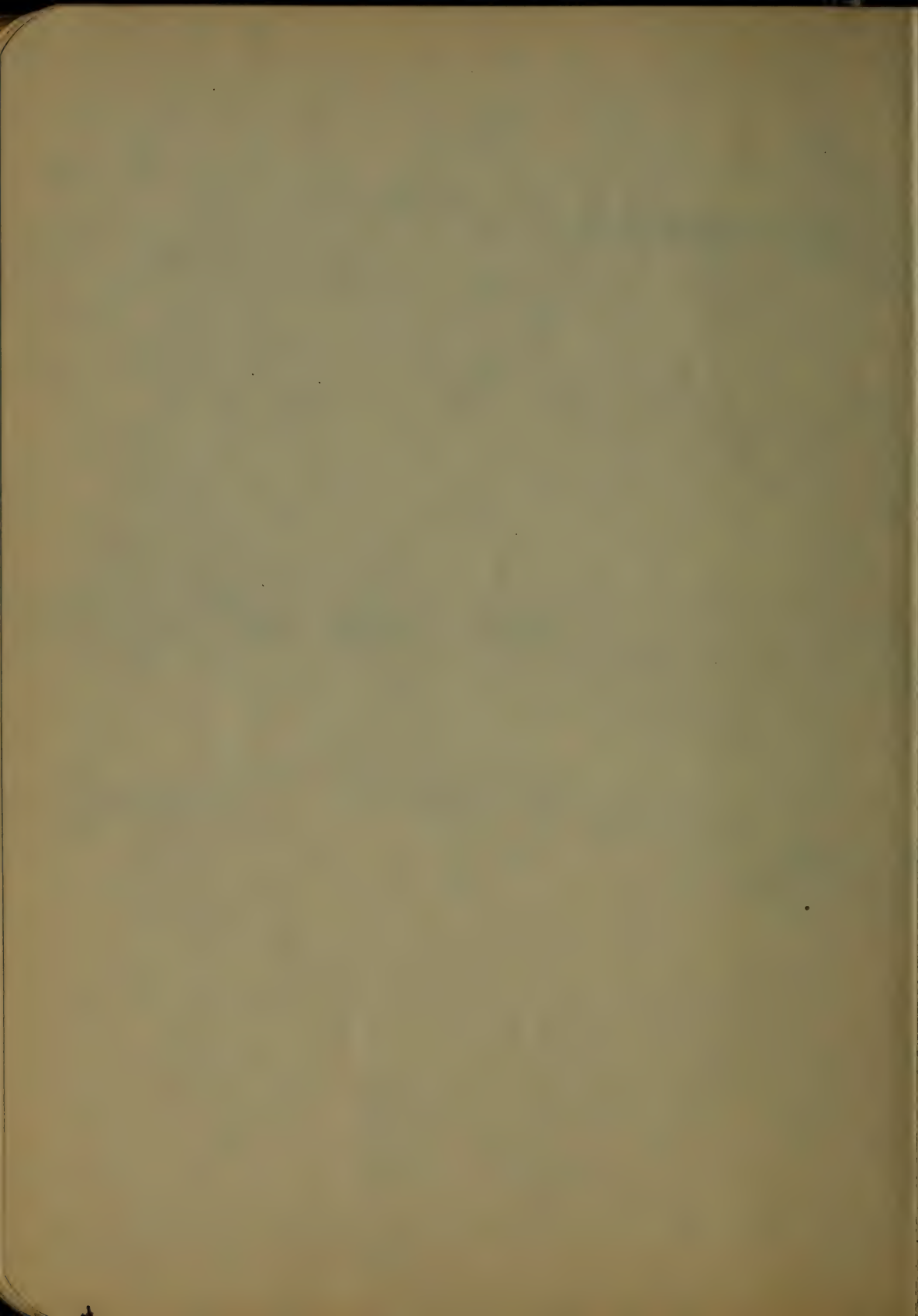
## STANDARD I-BEAMS.

CONCENTRATED LOAD AT THE CENTER IS  
FORMLY DISTRIBUTED.

COEFFICIENT OF STRENGTH FOR				COEFFICIENT DEFLECT.		WEIGHT PER FOOT IN LBS.	DEPTH OF BEAM INCH.
BUILDINGS.		BRIDGES.		1000 LBS CENTER LOAD. N	1000 LBS UNIFORM LOAD. N'		
16000 LBS. PER SQ. INCH.	ADDITIONAL FIBRE STRESS PER SQ. INCH. LBS. INCH. WEIGHT PER SQ. INCH.	12500 LBS. PER SQ. INCH.	ADDITIONAL FIBRE STRESS PER SQ. INCH. LBS. INCH. WEIGHT PER SQ. INCH.				
F	CARRIAGE	WT	CARRIAGE	INCHES.	INCHES.		
17630	1480	13790	1160	.00050006	.00031253	5.5	5
18560	1560	14500	1220	.00048065	.00029990	6	"
19140		14950		.00046124	.00028827	6.5	"
20710		16180		.00042630	.00026644	7.5	"
30400	2100	23800	1600	.00021640	.00013528	7	4
31510		24550		.00020815	.00013008	7.6	"
33890		26480		.00019535	.00012209	8.5	"
35980		28110		.00018400	.00011500	9.5	"
38070		29750		.00017359	.00010868	10.5	"
51590		40360		.00010267	.00006417	9.75	5
52900	2600	41300	2000	.00010152	.00006345	10	"
58100		45390		.00009187	.00005678	12.25	"
64630		50490		.00008195	.00005122	14.75	"
77460		60520		.00005692	.00003561	12.25	6
83500	3100	65800	2400	.00005205	.00003308	13	"
86270		66610		.00005177	.00003235	14.75	"
93110		72740		.00004741	.00002963	17.25	"
110410	3600	86260	2800	.00003427	.00002142	15	7
119400		93290		.00003168	.00001980	17.5	"
128540		100430		.00002943	.00001839	20.0	"
151660		118490		.00002183	.00001364	17.75	8
154000	4200	120300	3300	.00002151	.00001344	18	"
160810		125400		.00002062	.00001289	20.25	"
170970		133570		.00001936	.00001210	22.75	"
181430		141740		.00001825	.00001140	25.25	"
201300	4600	157260	3600	.00001462	.00000914	21	9
217930		170260		.00001350	.00000844	25	"
241060		188640		.00001219	.00000762	30	"
264490		207020		.00001110	.00000694	35	"
260470	5200	207500	4100	.00001017	.00000635	35	10
286250		223630		.00000925	.00000573	30	"
344000	5200	268800	4100	.00000796	.00000498	33	"
312390		244060		.00000848	.00000530	35	"
338530		264480		.00000762	.00000489	40	"
383670		299740		.00000675	.00000360	31.5	12
395200	6300	308800	4900	.00000553	.00000348	32	"
406800		317030		.00000544	.00000340	35	"
437170	6300	341540	4900	.00000505	.00000316	40	"
507930		396820		.00000435	.00000272	45	"
539300		421320		.00000409	.00000246	50	"
570670		445830		.00000387	.00000242	55	"
603200	7800	471300	6100	.00000290	.00000188	41	15
623270		490840		.00000281	.00000179	42	"
648310		506490		.00000272	.00000170	45	"

SEE PAGE 41.









# PROPERTIES OF

TO OBTAIN THE REQUIRED DEFLECTION  
BY THE CUBE OF SPAN AND BY THE

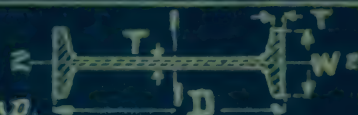
SECTION NUMBER		DEPTH OF BEAM, INCH.	WEIGHT PER FOOT IN LBS.	AREA OF SECTION, SQ. INCHES.	THICKNESS OF WEB, INCH.	WIDTH OF FLANGE, INCHES.	MOMENT OF INERTIA, AXIS 1-1, INCH. <sup>4</sup>	SECTION MO- DULUS, AXIS 1-1, INCH. <sup>3</sup>	RADIUS OF GYRATION, AXIS 1-1, INCHES	MOMENT OF INERTIA, AXIS 2-2, INCH. <sup>4</sup>	RADIUS OF GYRATION, AXIS 2-2, INCH.	INCREASED T. OF WEB FOR EACH POUND PER LINEAL FOOT IN DEFLECTION
CAMBRIDGE STEEL CO.	CARNEGIE STEEL CO.											
B33	B6	15	50	14.71	.52	5.65	483.4	64.5	5.98	16.24	1.04	.02
"	"	"	55	16.12	.66	5.75	511.0	68.1	5.62	17.06	1.03	.02
"	B5	"	60	17.65	.75	5.84	538.6	71.8	5.52	18.17	1.01	.02
B109	"	"	65	19.12	.69	6.10	636.1	84.8	5.77	27.02	1.20	.02
"	"	"	70	20.59	.78	6.19	663.7	88.5	5.48	29.00	1.19	.02
"	"	"	75	22.06	.88	6.29	691.2	92.2	5.60	30.68	1.18	.02
"	B4	"	80	23.53	.98	6.39	718.8	95.8	5.53	32.46	1.17	.02
B65	"	18	55	15.93	.46	6	795.4	88.4	7.07	21.19	1.15	.016
"	"	"	60	17.65	.66	6.10	841.8	98.5	6.91	22.38	1.13	.016
"	"	"	65	19.12	.64	6.18	881.5	97.9	6.79	23.47	1.11	.016
"	"	"	70	20.59	.72	6.26	921.2	102.4	6.69	24.52	1.09	.016
"	B3	20	64	18.8	.50	6.25	1146	114.6	7.8	27.3	1.2	.015
B75	"	"	65	19.08	.50	6.25	1169.5	117	7.83	27.84	1.21	.015
"	"	"	70	20.59	.58	6.33	1219.8	122	7.70	29.06	1.19	.015
"	"	"	75	22.06	.65	6.40	1268.3	126.9	7.58	30.28	1.17	.015
B121	B2	"	80	23.73	.60	7	1464.3	146.6	7.86	42.81	1.39	.018
"	"	"	85	25	.66	7.06	1508.4	150.9	7.77	47.23	1.37	.018
"	"	"	90	26.47	.74	7.14	1557.5	155.8	7.67	48.98	1.36	.018
"	"	"	95	27.94	.81	7.21	1606.6	160.7	7.58	50.78	1.35	.018
"	"	"	100	29.41	.88	7.28	1655.6	165.6	7.50	52.65	1.34	.018
B19	B1	24	80	23	.50	6.95	2059	171.6	9.42	41.6	1.34	.0123
"	"	"	80	23.32	.50	7	2087.2	173.9	9.46	42.86	1.36	.0123
"	"	"	85	25	.57	7.07	2167.8	180.7	9.31	44.35	1.33	.0123
"	"	"	90	26.47	.63	7.15	2232.4	186.5	9.20	45.7	1.31	.0123
"	"	"	95	27.94	.69	7.19	2309	192.4	9.09	47.1	1.30	.0123
"	"	"	100	29.41	.75	7.25	2379.6	198.3	8.99	48.55	1.28	.0123
B123	"	15	80	23.57	.80	6.40	789.1	105.2	5.79	41.31	1.32	.02
"	"	"	85	25	.90	6.50	815.9	108.2	5.71	43.46	1.32	.02
"	"	"	90	26.47	.99	6.59	843.4	112.5	5.64	45.79	1.32	.02
"	"	"	95	27.94	1.09	6.69	871.0	116.1	5.58	48.26	1.31	.02
"	"	"	100	29.41	1.19	6.79	898.6	119.6	5.53	50.84	1.31	.02

FOR BENDING MOMENTS, MAX. SHEAR AND MAX. DEFLECTION

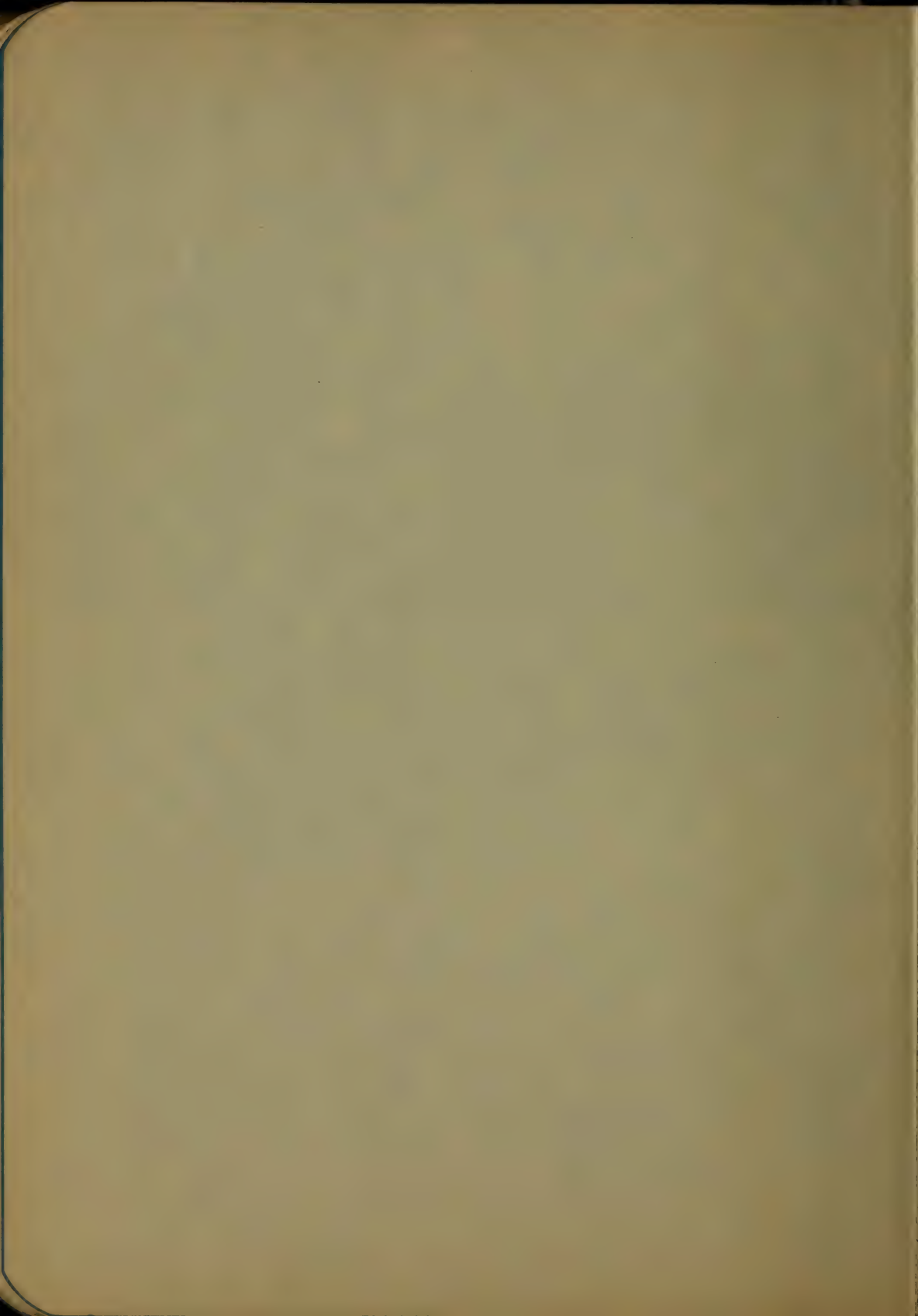


## STANDARD I-BEAMS.

MULTIPLY THE COEFFICIENT FROM TABLE  
NUMBER OF 1000 LBS. UNITS CONTAINED IN THE LOAD.



COEFFICIENT OF STRENGTH FOR				COEFF. OF DEFLECTION.		WEIGHT PER FOOT IN LBS.	DEPTH OF BEAM. INCH.
BUILDINGS.		BRIDGES.		1000 LBS. CENTER LOAD.	1000 LBS. UNIFORM LOAD.		
16000 LBS. PER SQ. INCHES. FIBRE STRESS	ADDITIONAL FOR EVERY LB. INCR. IN WEIGHT OF B.	12500 LBS. PER SQ. INCH. FIBRE STRESS	ADDITIONAL FOR EVERY LB. INCR. IN WEIGHT OF B.	INCHES.	INCHES.		
F	CARNEGIE	F	CARNEGIE				
687530	7800	537130	6100	.00000257	.00000161	50	15
726740		567770		.00000243	.00000152	55	"
765960	7800	598410	6100	.00000231	.00000144	60	"
904660		706770		.00000195	.00000127	65	"
943870		737400		.00000187	.00000122	70	"
983090		768040		.00000180	.00000117	75	"
1022300	7800	798670	6100	.00000173	.00000112	80	"
942880		736620		.00000156	.00000098	55	18
997680		779440		.00000148	.00000092	60	"
1044740		816200		.00000141	.00000088	65	"
1091800		852970		.00000135	.00000084	70	"
1222400	10450	955000	8200	.00000109	.00000067	64	20
1247490		974600		.00000106	.00000066	66	"
1301110		1016490		.00000102	.00000064	70	"
1353400		1057340		.00000098	.00000061	75	"
1564060		1221920		.00000085	.00000053	80	"
1609100		1257110		.00000082	.00000051	85	"
1661390		1297960		.00000080	.00000050	90	"
1713670		1338810		.00000077	.00000048	95	"
1765960		1379660		.00000075	.00000047	100	"
1830500	12800	1430100	10000	.00000061	.00000038	80	24
1855310		1449460		.00000060	.00000037	80	"
1926950		1505430		.00000057	.00000036	85	"
1989700		1554450		.00000056	.00000035	90	"
2052440		1603470		.00000054	.00000034	95	"
2115190		1652490		.00000052	.00000033	100	"
1122290		876790		.00000157	.00000098	80	15
1160340		906520		.00000152	.00000095	85	"
1199550		937150		.00000147	.00000092	90	"
1238770		967790		.00000143	.00000089	95	"
1277980		998420		.00000138	.00000086	100	"

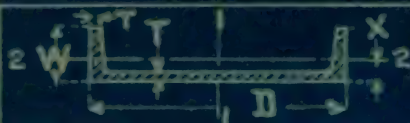






# PROPERTIES OF

## FOR BENDING MOMENTS, MAX.



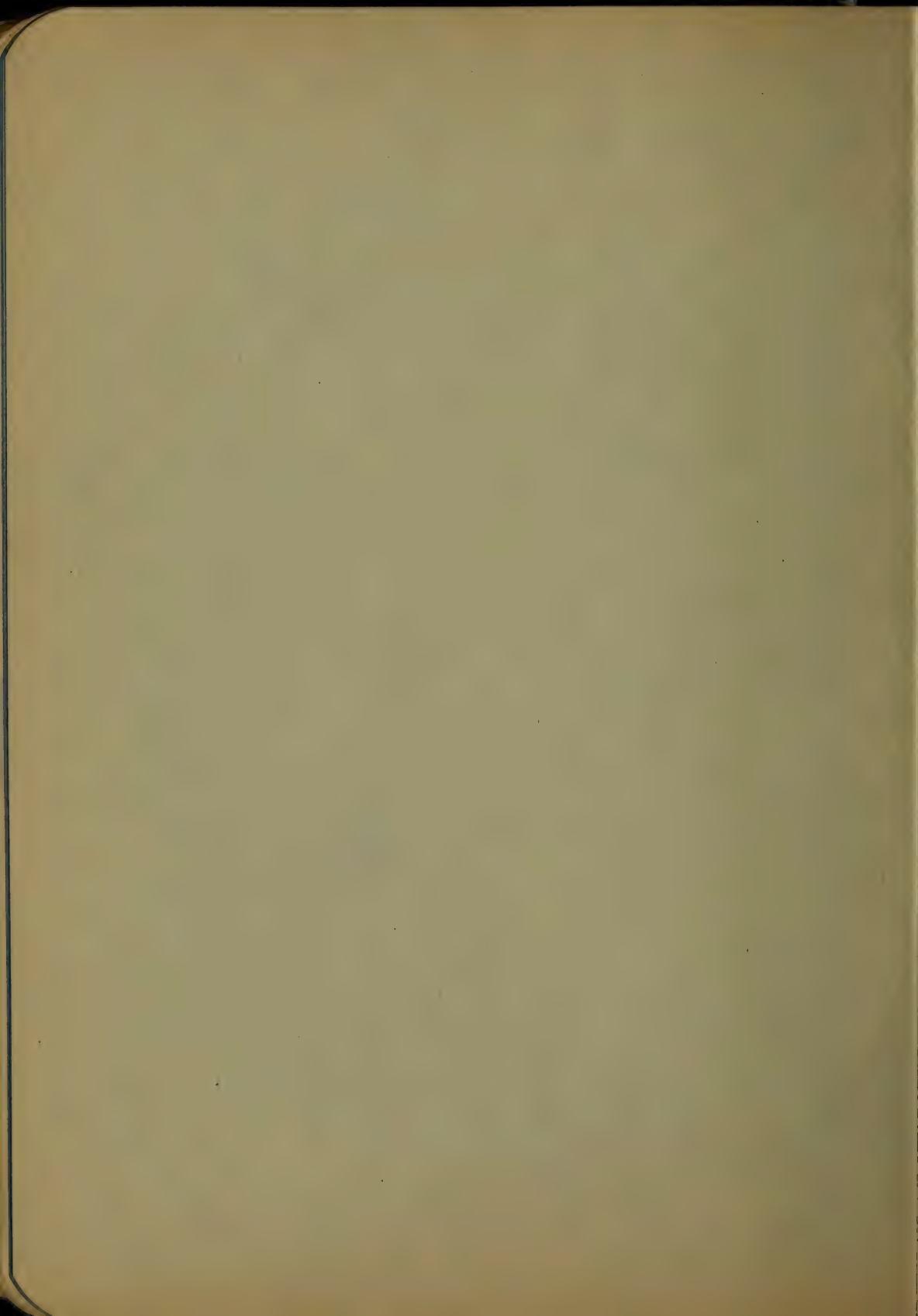
SECTION NUMBER	CAMBRIA STEEL CO.	CARNegie STEEL CO.	DEPTH OF CHANNEL INCH.	WEIGHT PER FOOT LBS.	AREA OF SECTION SQUARE INCHES	THICKNESS OF WEB T INCH.	WIDTH OF FLANGE W INCHES	MOMENT OF INERTIA AXIS 1-1 INCH <sup>4</sup>	SECTION MODULUS AXIS 1-1 INCHES	RADIUS OF GYRATION AXIS 1-1 INCHES	MOMENT OF INERTIA AXIS 2-2 INCH <sup>4</sup>	SECTION MODULUS AXIS 2-2 INCHES	RADIUS OF GYRATION AXIS 2-2 INCHES	DISTANCE OF NEUTRAL AXIS TO OUTSIDE OF WEB INCH.
C.5	C72		3	4	1.19	.17	1.41	1.6	11	1.17	.2	.21	.41	.44
"	"		"	"	1.47	.26	1.50	1.8	12	1.12	.25	.24	.42	.44
"	"		"	"	1.76	.36	1.60	2.1	1.4	1.03	.31	.27	.42	.46
C.9	C9		4	5.25	1.55	.18	1.58	3.8	1.9	1.56	.32	.29	.45	.46
"	"		"	5.5	1.6	.19	1.67	4.1	2.0	1.59	.35	.30	.45	.46
"	"		"	6.25	1.85	.25	1.65	4.2	2.1	1.51	.38	.32	.45	.46
"	"		"	7.25	2.13	.33	1.73	4.4	2.3	1.46	.44	.35	.46	.46
"	C9		"	8	2.4	.35	1.85	5.1	2.5	1.47	.45	.36	.48	.47
C.13	C8		5	6.5	1.95	.19	1.75	7.4	3.0	1.95	.43	.33	.50	.49
"	"		"	9	2.65	.33	1.89	8.9	3.5	1.83	.64	.45	.49	.48
"	"		"	11.5	3.38	.48	2.04	10.4	4.2	1.75	.82	.54	.49	.57
"	C.8		"	12	3.5	.50	2.10	10.9	4.4	1.77	.86	.56	.52	.53
C.17	C.7		6	8	2.38	.20	1.92	13	4.3	2.34	.7	.5	.54	.52
"	"		"	10.5	3.09	.32	2.04	15.1	5	2.21	.88	.57	.63	.50
"	"		"	13	3.82	.44	2.16	17.3	5.8	2.13	1.07	.65	.53	.52
"	"		"	15.5	4.56	.56	2.28	19.5	6.5	2.07	1.28	.74	.53	.55
"	C.7		"	16	4.7	.59	2.29	20.4	6.8	2.02	1.30	.76	.54	.55
C.21	C6		7	9.5	2.8	.21	2.01	20.4	5.8	2.71	.88	.61	.60	.53
"	"		"	9.75	2.85	.21	2.09	21.1	6	2.72	.98	.63	.59	.55
"	"		"	12.25	3.60	.32	2.20	24.2	6.9	2.59	1.19	.71	.57	.53
"	"		"	14.75	4.43	.42	2.30	27.2	7.8	2.50	1.40	.79	.57	.53
"	"		"	17.25	5.07	.53	2.41	30.2	8.6	2.44	1.62	.87	.56	.53
"	"		"	19.75	5.81	.63	2.51	33.2	9.5	2.39	1.85	.96	.56	.53
"	C.6		"	20	5.9	.65	2.45	33.0	9.4	2.37	1.97	1.05	.55	.57
C.25	C.5		8	11.25	3.35	.22	2.26	32.3	8.1	3.10	1.33	.79	.63	.58
"	"		"	13.75	4.04	.31	2.35	36.0	9	2.98	1.55	.87	.62	.56
"	"		"	16.25	4.76	.40	2.44	39.9	10	2.89	1.78	.95	.61	.56
"	"		"	18.75	5.51	.49	2.53	43.8	11	2.82	2.01	1.02	.60	.57
"	C.5		"	21.25	6.25	.58	2.62	47.8	11.9	2.76	2.25	1.11	.60	.59
C.29	C.4		9	13.25	3.89	.23	2.43	47.3	10.5	3.49	1.77	.97	.67	.61
"	"		"	15.0	4.41	.29	2.49	50.9	11.3	3.40	1.95	1.03	.66	.59
"	"		"	20.0	5.88	.45	2.65	60.8	13.5	3.21	2.45	1.19	.65	.58
"	C.4		"	25.0	7.35	.61	2.81	70.7	15.7	3.10	2.98	1.36	.64	.62
C.33	C3		10	15	4.46	.24	2.60	66.9	13.4	3.87	2.50	1.17	.72	.64
"	"		"	20	5.88	.38	2.74	78.7	15.7	3.66	2.85	1.34	.70	.61
"	"		"	25	7.35	.53	2.89	91.0	18.2	3.52	3.40	1.5	.68	.62
"	C3		"	30	8.82	.68	3.04	103.2	20.6	3.42	3.99	1.67	.67	.65
"	"		"	35	10.29	.82	3.18	115.5	23.1	3.35	4.66	1.87	.67	.69
C.41	C2		12	20.5	6.03	.28	2.94	128.1	21.4	4.41	3.91	1.75	.81	.70
"	"		"	25	7.35	.39	3.05	144	24	4.43	4.53	1.91	.78	.68
"	"		"	30	8.82	.51	3.17	161.6	26.9	4.28	5.21	2.09	.77	.68
"	"		"	35	10.29	.64	3.30	179.3	32.8	4.17	5.90	2.27	.76	.69
"	C.2		"	40	11.76	.76	3.42	196.9	29.9	4.09	6.63	2.46	.75	.72
C.20	"		13	31.5	9.3	.38	4	237.6	36.5	5.05	.	.	.	1.01
"	"		"	52	15.3	.84	4.46	322.4	49.6	4.59	.	.	.	.99
C.53	C.1		15	33	9.90	.40	3.40	312.6	41.7	5.62	8.23	3.16	.91	.79
"	"		"	35	10.29	.43	3.43	319.9	42.7	5.57	8.48	3.22	.91	.79
"	"		"	40	11.76	.52	3.52	347.5	46.3	5.44	9.39	3.43	.89	.78
"	"		"	46	13.24	.62	3.62	375.1	50	5.32	10.29	3.63	.88	.79
"	"		"	50	14.71	.72	3.72	402.7	53.7	5.23	11.22	3.85	.87	.80
"	C.1		"	55	16.18	.82	3.82	430.2	57.4	5.16	12.19	4.07	.87	.82



## STANDARD CHANNELS.

SHEAR AND MAX. DEFLECTION.  
SEE PAGE 41.

INCH.	INCREASE OF T PER EACH LB. IN WEIGHT.	COEFFICIENT OF STRENGTH FOR				COEF. OF DEFLECTION		WEIGHT PER FOOT IN LBS.	DEPTH OF BEAM, INCH.
		BUILDINGS.		BRIDGES.		1000 LBS. CENTER LOAD N	1000 LBS. UNIFORM LOAD N'		
		16000 LBS. PER SQ. INCHES FIBRE STR.	ADDITIONAL FOR EVERY LB. INCREASE OF WEIGHT OF B.	12500 LBS. PER SQ. INCHES FIB. STRESS.	ADDITIONAL FOR EVERY LB. INCREASE OF WEIGHT OF B.				
		F	CARNEGIE	F	CARNEGIE	INCHES.	INCHES		
.098	11630			9090		.0007589	.0004743	4	3
.098	13140			10270		.0006718	.0004199	5	"
.098	14710			11490		.0006001	.0003751	6	"
.074	20230			15800		.0003273	.0002046	5.25	4
.074	21700			17000		.0003100	.0001965	5.5	"
.074	22270			17400		.0002973	.0001858	6.25	"
.074	24360			19030		.0002717	.0001698	7.25	"
.074	27000			21100		.0002540	.0001432	8	"
.059	31640			24720		.0001674	.0001046	6.5	5
.059	37860			29570		.0001399	.0000875	9	"
.059	44390			34680		.0001193	.0000746	11.5	"
.059	46400			36200		.0001075	.0000680	12	"
.049	46210			36100		.0000855	.0000597	8	6
.049	53750			42000		.0000821	.0000513	10.5	"
.049	61600			48100		.0000717	.0000448	13	"
.049	69440			54250		.0000636	.0000397	15.5	"
.049	72300			56500		.0000596	.0000385	16	"
.042	62200			48600		.0000620	.0000390	9.5	7
.042	64270			50210		.0000538	.0000368	9.75	"
.042	73650			57540		.0000514	.0000321	12.25	"
.042	82740			64690		.0000457	.0000286	14.75	"
.042	91950			71840		.0000411	.0000257	17.25	"
.042	101100			78990		.0000374	.0000234	19.75	"
.042	101800			79000		.0000332	.0000203	20	"
.037	86140			67300		.0000384	.0000240	11.25	8
.037	95990			75000		.0000345	.0000216	13.75	"
.037	106450			83170		.0000311	.0000194	16.25	"
.037	116910			91340		.0000283	.0000177	18.75	"
.037	127370			99510		.0000260	.0000162	21.25	"
.033	112170			87630		.0000262	.0000164	13.25	9
.033	120540			94170		.0000244	.0000153	15	"
.033	144070			112550		.0000204	.0000128	20	"
.033	167590			130930		.0000176	.0000110	25	"
.029	142680			111470		.0000186	.0000106	15	10
.029	167940			131210		.0000158	.0000099	20	"
.029	194090			151630		.0000136	.0000085	25	"
.029	220280			172060		.0000120	.0000076	30	"
.029	246380			192480		.0000107	.0000067	35	"
.025	227750			177930		.0000097	.0000061	24.5	12
.025	256000			200000		.0000086	.0000054	25	"
.025	287370			224510		.0000077	.0000048	30	"
.025	318750			249020		.0000069	.0000043	35	"
.025	350120			273530		.0000063	.0000039	40	"
.023	389800			304500		.0000058	.0000032	31.5	13
.023	529000			413300		.0000035	.0000022	52	"
.020	444520			347280		.0000048	.0000025	33	15
.020	455030			355400		.0000039	.0000024	35	"
.020	494250			386130		.0000026	.0000022	40	"
.020	533470			447410		.0000033	.0000021	45	"
.020	572680			416770		.0000031	.0000019	50	"
.020	611900			478050		.0000029	.0000018	55	"







# PROPERTIES OF STANDARD ANGLES. EQUAL LEGS.



FOR BENDING MOMENT, MAX. SHEAR  
AND MAX. DEFLECTION SEE PAGE 41.

SECTION NUMBER	CAMBRIA STEEL CO.	CARNEGIE STEEL CO.	DIMENSIONS INCHES.	THICKNESS INCHES	WEIGHT PER FOOT, LBS.	AREA OF SECTION SQ. INCHES.	DISTANCE OF GRA- VITY FROM BACK OF FLANGE.	MOMENT OF INERTIA AXIS M INCH <sup>4</sup>	SECTION MO- DULUS AXIS M INCH <sup>3</sup>	RADIUS OF GY- RATION AXIS M INCH.	CENTRE OF GRAVITY FROM EXT. AP- PROX. LINE OF ANGLE	LEAST MOMENT OF INERTIA AXIS Z INCH <sup>4</sup>	SECTION MODU- LUS AXIS Z INCH <sup>3</sup>	LEAST RADIUS OF GYRATION AXIS Z INCH
			B x B	T	W	A	X	I	S	R	X"	I"	S"	R"
A5	A84		3/4 x 3/4	1/8	.58	.17	.23	.009	.017	.22	.33	.004	.011	.14
"	83		"	3/16	.84	.25	.25	.012	.024	.22	.36	.005	.014	.14
A7	80		1 x 1	1/8	.80	.23	.30	.022	.031	.30	.42	.009	.021	.19
"	78		"	3/16	1.16	.34	.32	.030	.044	.30	.45	.013	.028	.19
"	77		"	1/4	1.49	.44	.34	.037	.056	.29	.48	.016	.034	.19
A9	73		1 1/4 x 1 1/4	1/8	1.02	.30	.36	.044	.049	.38	.51	.018	.035	.24
"	72		"	3/16	1.47	.43	.38	.061	.071	.38	.54	.025	.047	.24
"	71		"	1/4	1.91	.56	.40	.077	.091	.37	.57	.033	.057	.24
"	70		"	5/16	2.32	.68	.42	.090	.109	.36	.60	.040	.066	.24
A11	69		1 1/2 x 1 1/2	3/16	1.79	.53	.44	.11	.104	.46	.63	.045	.072	.29
"	68		"	1/4	2.34	.69	.47	.14	.134	.45	.66	.058	.088	.29
"	67		"	5/16	2.86	.84	.49	.16	.162	.44	.69	.070	.101	.29
"	66		"	3/8	3.35	.98	.51	.19	.188	.44	.72	.082	.114	.29
A13	65		1 3/4 x 1 3/4	3/16	2.11	.62	.51	.18	.14	.54	.72	.073	.10	.34
"	64		"	1/4	2.77	.81	.53	.23	.19	.53	.75	.094	.13	.34
"	63		"	5/16	3.39	1.00	.55	.27	.23	.52	.78	.113	.15	.34
"	62		"	3/8	3.98	1.17	.57	.31	.26	.51	.81	.133	.16	.34
"	61		"	7/16	4.56	1.34	.59	.35	.30	.51	.84	.152	.18	.34
A15	60		2 x 2	3/16	2.43	.71	.57	.27	.19	.62	.80	.11	.14	.39
"	59		"	1/4	3.19	.94	.59	.35	.25	.61	.84	.14	.17	.39
"	58		"	5/16	3.92	1.15	.61	.42	.30	.60	.87	.17	.20	.39
"	57		"	3/8	4.62	1.36	.64	.48	.35	.59	.90	.20	.22	.39
"	56		"	7/16	5.30	1.56	.66	.54	.40	.59	.93	.23	.25	.38
A41	55		2 1/4 x 2 1/4	3/16	2.7	.81	.63	.39	.24	.70	.89	.16	.25	.44
"	54		"	1/4	3.4	1.06	.65	.50	.32	.69	.92	.21	.31	.44
"	53		"	5/16	4.4	1.31	.68	.61	.39	.68	.96	.25	.37	.44
"	52		"	3/8	5.3	1.55	.70	.70	.45	.67	.99	.29	.42	.43
A17	50		2 1/2 x 2 1/2	1/4	4	1.19	.72	.70	.39	.77	1.01	.29	.28	.49
"	49		"	5/16	5	1.46	.74	.85	.48	.76	1.05	.35	.33	.49
"	48		"	3/8	5.9	1.73	.76	.98	.57	.75	1.08	.41	.38	.48
"	47		"	7/16	6.8	2	.78	1.11	.65	.75	1.11	.46	.42	.48
"	46		"	1/2	7.7	2.25	.81	1.23	.72	.74	1.14	.52	.46	.48
A43	45		2 3/4 x 2 3/4	3/16	3.4	1	.76	.73	.37	.86	1.07	.30	.39	.54
"	44		"	1/4	4.5	1.31	.78	.95	.48	.85	1.10	.38	.49	.54
"	43		"	5/16	5.5	1.62	.80	1.15	.59	.84	1.13	.47	.58	.54
"	42		"	3/8	6.5	1.92	.82	1.33	.69	.83	1.17	.55	.66	.53

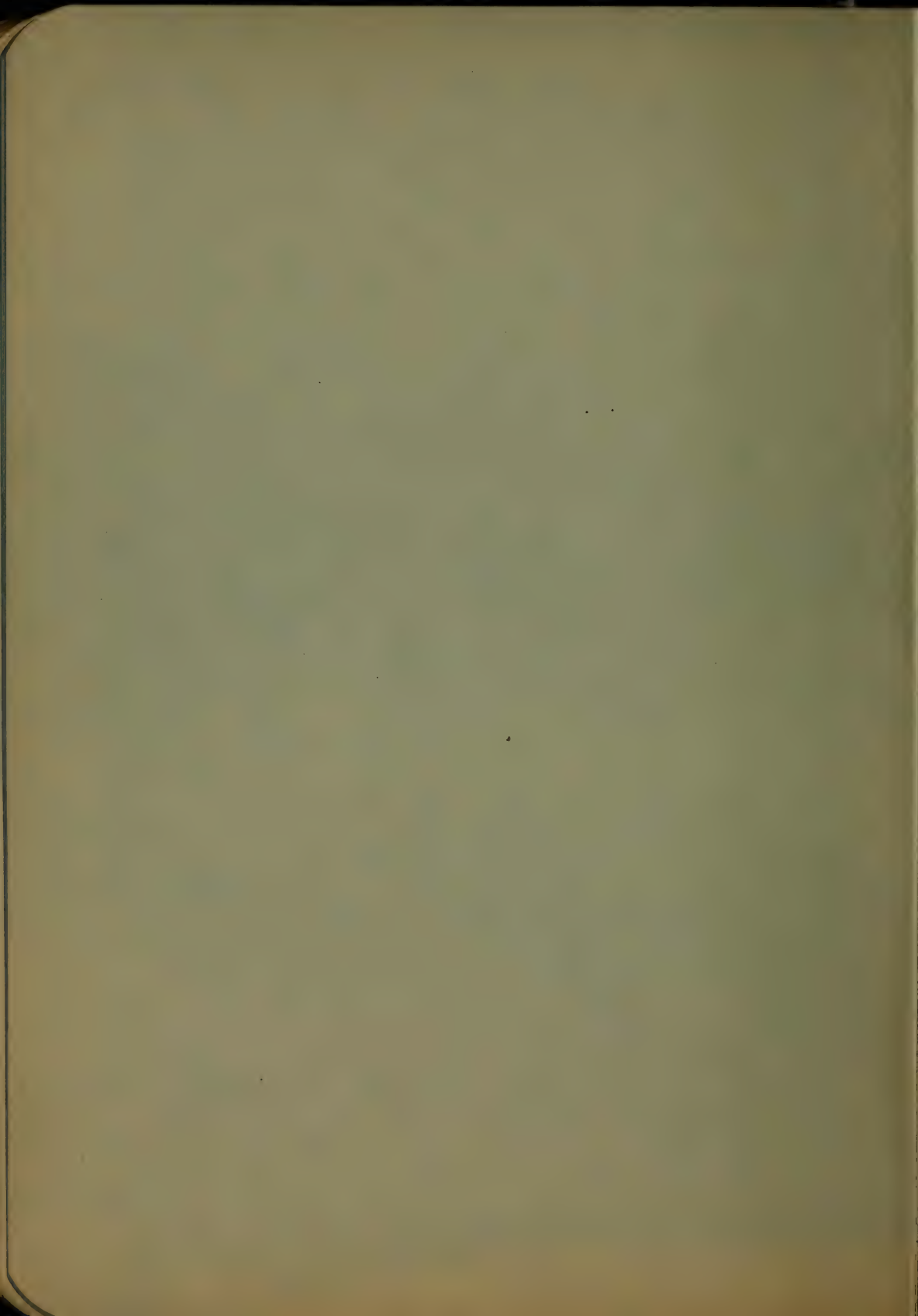


# STANDARD ANGLE IRONS. EQUAL LEGS.

SECTION  
NUMBER

CA	CE	Bx B	T	A	X	I	S	R	X"	I"	S"	R"	W
A43	A41	2½ x 2½	7/16	2.21	.85	1.51	.79	.83	1.20	.63	.74	.53	7.5
A19	40	3 x 3	9/16	1.44	.84	1.24	.58	.93	1.19	.50	.42	.59	4.9
"	39	"	5/16	1.78	.87	1.51	.71	.92	1.22	.61	.50	.59	6
"	38	"	3/8	2.11	.89	1.76	.83	.91	1.26	.72	.57	.58	7.2
"	37	"	7/16	2.43	.91	1.99	.95	.91	1.29	.82	.64	.58	8.3
"	36	"	1/2	2.75	.93	2.22	1.07	.90	1.32	.92	.70	.58	9.4
"	35	"	3/16	3.06	.95	2.43	1.19	.89	1.35	1.02	.76	.58	10.4
"	34	"	5/8	3.36	.98	2.62	1.3	.88	1.38	1.12	.81	.58	11.4
A21	33	3½ x 3½	3/8	2.48	1.01	2.87	1.15	1.07	1.43	1.16	.81	.68	8.4
"	32	"	7/16	2.87	1.04	3.26	1.32	1.07	1.46	1.33	.91	.68	9.8
"	31	"	1/2	3.25	1.06	3.64	1.49	1.06	1.50	1.5	1	.68	11.1
"	30	"	3/16	3.62	1.08	3.99	1.65	1.05	1.53	1.66	1.09	.68	12.3
"	29	"	5/8	3.98	1.10	4.33	1.81	1.04	1.56	1.82	1.17	.68	13.5
"	28	"	11/16	4.34	1.12	4.65	1.96	1.04	1.59	1.97	1.24	.67	14.8
"	27	"	3/4	4.69	1.15	4.96	2.11	1.03	1.62	2.13	1.31	.67	15.9
"	26	"	13/16	5.03	1.17	5.25	2.25	1.02	1.65	2.28	1.38	.67	17.1
A23	90	4 x 4	5/16	2.4	1.12	3.71	1.29	1.24	1.58	1.50	.95	.79	8.2
"	"	"	3/8	2.86	1.14	4.36	1.52	1.23	1.61	1.77	1.1	.79	9.7
"	"	"	7/16	3.31	1.16	4.97	1.75	1.23	1.64	2.02	1.23	.78	11.2
"	"	"	1/2	3.75	1.18	5.56	1.97	1.22	1.67	2.28	1.36	.78	12.8
"	"	"	3/16	4.18	1.21	6.12	2.19	1.21	1.71	2.52	1.43	.78	14.2
"	"	"	5/8	4.61	1.23	6.66	2.40	1.20	1.74	2.76	1.59	.77	15.7
"	"	"	11/16	5.03	1.25	7.17	2.61	1.19	1.77	3	1.70	.77	17.1
"	"	"	3/4	5.44	1.27	7.66	2.81	1.19	1.80	3.23	1.8	.77	18.5
"	18	"	13/16	5.84	1.29	8.14	3.01	1.18	1.83	3.46	1.89	.77	19.9
A45	"	4½ x 4½	5/16	2.71	1.24	5.36	1.64	1.40	1.75	2.16	1.74	.89	9.2
"	"	"	3/8	3.23	1.26	6.3	1.95	1.40	1.79	2.54	2.01	.89	11
"	"	"	7/16	3.75	1.29	7.2	2.24	1.39	1.82	2.92	2.27	.88	12.7
"	"	"	1/2	4.26	1.31	8.07	2.53	1.38	1.85	3.29	2.51	.88	14.3
"	"	"	3/16	4.75	1.33	8.91	2.81	1.37	1.88	3.64	2.74	.88	16.1
"	"	"	5/8	5.23	1.35	9.71	3.09	1.36	1.91	3.99	2.95	.87	17.8
A47	17	5 x 5	3/8	3.61	1.39	8.74	2.42	1.56	1.96	3.53	2.54	.99	12.3
"	16	"	7/16	4.18	1.41	10.02	2.79	1.55	2	4.05	2.87	.98	14.2
"	15	"	1/2	4.75	1.43	11.25	3.16	1.54	2.03	4.56	3.18	.98	16.2
"	14	"	3/16	5.31	1.46	12.44	3.51	1.53	2.06	5.06	3.48	.98	18
"	13	"	5/8	5.86	1.48	13.58	3.86	1.52	2.09	5.55	3.76	.97	19.9
A27	8	6 x 6	7/16	5.06	1.66	17.68	4.07	1.97	2.34	7.13	3.44	1.19	17.2
"	7	"	1/2	5.75	1.68	19.41	4.61	1.86	2.38	8.04	3.37	1.18	19.6
"	6	"	9/16	6.45	1.71	22.07	5.14	1.85	2.41	8.94	3.7	1.18	21.9
"	5	"	5/8	7.11	1.73	24.16	5.66	1.84	2.45	9.81	4.01	1.17	24.2
"	4	"	11/16	7.78	1.75	26.19	6.17	1.83	2.48	10.67	4.31	1.17	26.4
"	3	"	3/4	8.44	1.78	28.15	6.66	1.83	2.51	11.52	4.59	1.17	28.7
"	2	"	13/16	9.09	1.80	30.06	7.15	1.82	2.54	12.35	4.86	1.17	30.9
"	1	"	3/8	9.73	1.82	31.92	7.63	1.81	2.57	13.17	5.12	1.16	33.1

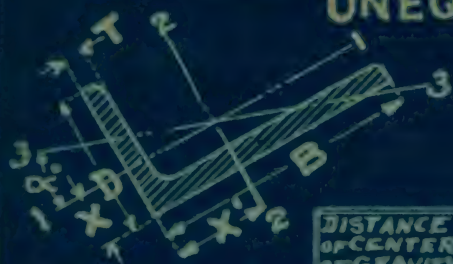






# PROPERTIES OF STANDARD ANGLES. UNEQUAL LEGS.

FOR BENDING MOMENT, MAX. SHEAR  
AND MAX. DEFLECTION SEE PAGE 41.



B x D	T	W	A	X	X'	I	I'	S	S'	R	R'	R''	TANG OX
1 1/8 x 1	1/8	1	.28	.26	.44	.02	.05	.03	.06	.29	.44	.22	
1 1/8 x 1	3/32	1.6	.47	.29	.48	.04	.08	.05	.09	.28	.42	.23	
2 x 1 1/8	3/16	2.1	.60	.35	.66	.09	.24	.09	.18	.40	.63	.29	.475
2 x 1 3/8	1/4	2.7	.78	.37	.69	.12	.37	.12	.23	.39	.63	.30	.414
2 1/4 x 1 1/2	3/16	2.3	.67	.37	.75	.12	.34	.11	.23	.43	.72	.40	
"	1/2	5.5	1.63	.48	.86	.26	.82	.26	.59	.4	.71	.39	
2 1/2 x 2	3/16	2.8	.81	.51	.76	.29	.51	.2	.29	.6	.79	.43	.632
"	1/2	6.8	2	.63	.88	.64	1.14	.46	.7	.56	.75	.44	.6
3 x 2	3/32	3.6	1.05	.48	.98	.35	.97	.23	.48	.58	.96	.44	.443
"	1/2	7.7	2.25	.58	1.08	.67	1.92	.47	1	.58	.92	.47	.486
3 x 2 1/2	1/4	4.5	1.31	.66	.91	.74	1.17	.4	.56	.75	.95	.53	.684
"	3/16	9.5	2.78	.77	1.62	1.42	2.28	.82	1.15	.72	.91	.54	.661
3 1/4 x 2	1/4	4.3	1.25	.48	1.09	.4	1.36	.26	.63	.57	1.04	.44	
"	3/16	9	2.64	.59	1.21	.75	2.64	.53	1.3	.53	1	.45	
3 1/2 x 2 1/2	1/4	4.9	1.44	.61	1.11	.78	1.8	.41	.75	.74	1.12	.55	.506
"	11/16	12.4	3.65	.77	1.27	1.72	4.13	.99	1.85	.67	1.06	.58	.468
3 1/2 x 3	5/16	6.6	1.93	.81	1.06	1.58	2.33	.72	.96	.90	1.1	.63	.724
"	13/16	15.7	4.62	.98	1.23	3.33	4.98	1.65	2.2	.85	1.04	.65	.694
4 x 3	5/16	7.1	2.09	.76	1.26	1.65	3.38	.74	1.23	.89	1.27	.65	.554
"	13/16	17.1	5.03	.94	1.44	3.47	7.34	1.68	2.87	.83	1.21	.64	.518
4 x 3 1/2	3/8	9.1	2.67	.96	1.21	2.89	4.18	1.48	1.5	1.06	1.25	.73	.755
"	13/16	18.5	5.43	1.11	1.36	5.49	7.77	2.3	2.92	1.01	1.19	.74	.737
4 1/2 x 3	3/8	9.1	2.67	.74	1.49	1.98	5.5	.88	1.83	.86	1.44	.66	.440
"	13/16	18.5	5.43	.90	1.65	3.60	10.33	1.71	3.62	.81	1.38	.67	.410
5 x 3	5/16	8.2	2.40	.68	1.68	1.75	6.26	.75	1.89	.85	1.61	.66	.368
"	13/16	19.6	5.84	.86	1.86	3.71	13.98	1.94	4.45	.80	1.55	.66	.336
5 x 3 1/2	3/8	10.4	3.05	.86	1.61	3.18	7.78	1.21	2.29	1.02	1.68	.76	.485
"	7/8	22.7	6.67	1.04	1.79	6.21	15.67	2.52	4.88	.96	1.53	.77	.453
5 x 4	7/16	11	3.23	1.03	1.53	4.67	8.14	1.57	2.34	1.20	1.59	.86	.631
"	7/8	24.2	7.11	1.21	1.71	9.23	16.42	3.31	4.99	1.14	1.52	.88	.609
6 x 3 1/2	3/8	11.7	3.42	.79	2.04	3.34	12.86	1.23	3.25	.99	1.94	.77	.350
"	7/8	25.7	7.85	.97	2.22	6.55	26.38	2.59	6.98	.93	1.87	.78	.323
6 x 4	3/8	12.3	3.61	.94	1.94	4.9	13.47	1.60	3.32	1.17	1.93	.88	.446
"	7/8	27.2	7.99	1.12	2.12	9.75	27.73	3.59	7.15	1.1	1.86	.88	.421
7 x 3 1/2	3/16	15	4.4	.75	2.50	3.95	22.36	1.47	5.01	.95	2.26	.89	
"	1	32.3	9.5	.96	2.71	7.53	45.37	2.96	10.58	.89	2.59	.88	



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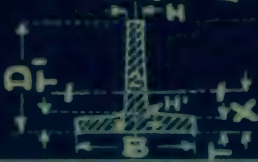






# PROPERTIES OF STANDARD T-BARS.

CAMBRIA AND CARNEGIE SECTIONS.



WEIGHT PER FOOT	AREA OF SECTION	DISTANCE CENTRITY TO GRADE	MOMENT INCHES <sup>2</sup>	SECTION MODULUS INCHES	RADIUS OF GYRATION INCHES	MOMENT INCHES <sup>2</sup>	SECTION MODULUS INCHES	RADIUS OF GYRATION INCHES	COEFFICIENT OF STRENGTH
									12000/10000 LBS/50 INCH. FIBRE STRESS

B	D	T	T <sub>0</sub>	H	H <sub>0</sub>	W	A	X	I	S	R	I	S	R	F	F'
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## EQUAL LEGS.

1	1	1/8	5/32	1/8	1/8	1/32	.89	.26	.29	.02	.03	.3	.01	.02	.21	260	220
1 1/8	1 1/8	3/16	7/32	5/16	5/16	1/32	1.39	.41	.33	.04	.05	.32	.02	.04	.25	420	350
1 1/4	1 1/4	3/16	1/4	5/16	5/16	1/32	1.54	.45	.34	.05	.06	.33	.03	.05	.26	470	390
1 1/2	1 1/2	3/16	1/4	5/16	5/16	1/32	1.61	.47	.36	.06	.07	.35	.03	.05	.27	520	440
2	2	1/4	3/8	1/2	1/2	1/32	1.85	.54	.39	.08	.08	.39	.05	.07	.29	660	550
2 1/4	2 1/4	1/4	3/8	1/2	1/2	1/32	3.7	1.05	.59	.37	.26	.59	.18	.18	.42	2070	1730
2 1/2	2 1/2	3/16	3/8	5/16	5/16	1/32	4.3	1.26	.61	.43	.31	.59	.23	.23	.42	2500	2080
2 3/4	2 3/4	1/4	3/8	1/2	1/2	1/32	4.1	1.19	.68	.51	.32	.65	.24	.22	.45	2580	2150
3	3	3/8	1/2	3/4	3/4	1/32	7.8	2.27	.88	1.82	.86	.90	.92	.61	.64	6890	5740
3 1/2	3 1/2	3/8	1/2	3/4	3/4	1/32	9.3	2.74	.99	3.1	1.23	1.08	1.42	.81	.73	9850	8210

## UNEQUAL LEGS.

1 1/4	1 1/4	3/16	1/4	5/16	5/16	1/32	1.49	.44	.29	.04	.05	.29	.03	.01	.28	350	310
3	2 1/2	3/8	3/16	3/8	3/16	1/32	7.2	2.07	.74	1.08	.6	.64	.9	.6	.66	4800	4000
3 1/2	4	3/8	3/16	3/8	3/16	1/32	9.9	2.91	1.2	4.3	1.54	1.23	1.42	.81	.7	12350	10290

# PROPERTIES OF STANDARD TROUGH PLATES.



CAMBRIA.



CARNEGIE.

D SIZE	W	A	T	B	H	I	S	R	X	COEF. OF STRENGTH F	COEF. OF DEFLECTION F'	N	N'
5"	15.2	4.46	1/2	4.29	1/4	4.33	1.58	.99	.99	16890	13190	.000287	.000179
"	19.3	5.68	1/2	4.5	3/4	6.72	2.48	1.08	1.28	26460	20680	.000186	.000116
"	23.5	6.91	3/4	4.5	3/8	7.48	2.66	1.04	1.17	28370	22160	.000166	.000104
9 1/2 x 3 3/4	16.32	4.8	1/2	4 3/8	1/4	3.68	1.38	.91		FOR 16000	FOR 12500		
"	18.02	5.3	3/16	"	"	4.13	1.57	.91		16000	12500		
"	19.72	5.8	5/16	"	"	4.57	1.77	.90					
"	21.42	6.3	1/16	"	"	5.02	1.96	.90					
"	23.15	6.8	3/4	"	"	5.46	2.15	.90					

# PROPERTIES OF STANDARD CORRUGATED PLATES & SHEETS.



CARNEGIE STEEL CO.

LAP 6 1/2"

WIDTH OF SHEETS = 30"

W' WEIGHT OF SQ. FEET. LENGTH OF SHEETS

B x D	W	A	T	I	S	R	W'	N°	T	W'	100 SQ. FEET PER SHEET OF	6'	7'	8'	9'	10'
8 3/4 x 1 1/2	8.06	2.4	1/4	.64	.80	.52	11.05	16	.066	3.28	358	353	350	348	346	346
"	10.1	3	5/16	.95	1.15	.57	13.78	18	.049	2.48	270	267	264	262	261	261
"	12.04	3.5	3/8	1.25	1.42	.62	16.5	20	.035	1.76	192	190	188	186	185	185
12 3/4 x 2 3/4	17.75	5.2	2/8	4.79	3.33	.96	17.47	22	.028	1.41	154	152	150	149	148	148
"	20.71	6.1	7/16	6.81	3.9	.98	20.39	24	.022	1.11	119	119	118	117	117	117
"	23.67	7	1/2	6.82	4.46	.99	23.3	26	.018	.91	99	97	97	96	95	95





13000 LBS/SQ. INCH.

BEAM BOX

GIRDERS.

FIBRE STRESS.

TWO PLATES & TWO BEAMS. SAFE LOAD IN TONS OF 3/4" RIVETS. 13/16" RIVET HOLES.

L = SAFE LOAD UNIFORMLY DISTRIBUTED, INCLUDING WEIGHT OF GIRDER, IN TONS OF 2000 LBS.



U <sub>1</sub> P <sub>1</sub> U <sub>2</sub>	P = 2 x 12" x 1/2" B = 2 x 10" x 3/8" A = 5 1/2"			P = 2 x 12" x 1/2" B = 2 x 10" x 1/4" A = 5 1/2"			P = 2 x 12" x 1/2" B = 2 x 10" x 1/4" A = 6"			P = 2 x 14" x 1/2" B = 2 x 12" x 3/8" A = 6"			P = 2 x 14" x 5/8" B = 2 x 15" x 1/2" A = 6 1/2"			P = 2 x 14" x 3/4" B = 2 x 15" x 5/8" A = 6 1/2"			P = 2 x 14" x 3/4" B = 2 x 15" x 3/4" A = 6 1/2"						
	L	W	IL	L	W	IL	L	W	IL	L	W	IL	L	W	IL	L	W	IL	L	W	IL	L	W	IL	
10	44.35	.85	2.59	38.97	.47	2.64	64.94	.63	3.75	58.08	.57	3.31	125.45	1.11	111.01	.91	90.29	.72	46.5						
11	40.32	.65	2.36	35.42	.52	2.40	59.02	.78	3.4	63.8	.63	3.45	114.05	1.22	100.92	1.09	82.08	.79	42.1						
12	36.96	.65	2.16	32.47	.56	2.20	54.12	.84	3.12	48.4	.68	3.17	104.55	1.33	92.67	1.18	75.24	.86	38.7						
13	34.12	.71	1.99	29.96	.61	2.03	49.35	.91	2.68	44.68	.74	2.93	96.50	1.44	85.40	1.27	69.45	.93	33.1						
14	31.68	.76	1.85	27.63	.66	1.89	46.39	.97	2.5	41.48	.8	2.72	89.61	1.55	79.3	1.36	64.5	1.08	30.9						
15	29.57	.82	1.62	25.98	.75	1.65	43.29	1.04	2.34	38.72	.85	2.53	83.64	1.67	74.01	1.45	60.19	1.15	27.57						
16	27.72	.87	1.52	24.38	.80	1.55	40.59	1.17	2.08	36.3	.91	2.38	78.41	1.78	69.38	1.54	56.43	1.22	25.2						
17	26.09	.93	1.44	22.93	.85	1.47	38.08	1.23	1.97	34.16	.97	2.24	73.8	1.89	65.3	1.63	53.11	1.29	23.7						
18	24.64	.98	1.36	21.64	.89	1.39	34.18	1.31	1.87	32.27	1.08	2.11	69.7	2.11	61.67	1.72	47.52	1.36	22.2						
19	23.34	1.04	1.3	20.51	.93	1.32	32.47	1.36	1.78	30.57	1.08	1.90	66.03	2.22	58.43	1.81	45.14	1.51	21.1						
20	22.16	1.09	1.23	19.49	.98	1.26	30.93	1.43	1.70	29.04	1.20	1.81	62.73	2.33	55.86	1.9	42.99	1.54	20.2						
21	21.12	1.15	1.18	18.56	1.03	1.20	29.52	1.49	1.63	27.66	1.25	1.73	59.74	2.44	53.46	2.04	41.04	1.58	19.1						
22	20.28	1.26	1.13	17.71	1.07	1.15	28.30	1.56	1.56	26.25	1.31	1.65	57.03	2.55	51.54	2.16	39.25	1.68	18.5						
23	19.48	1.31	1.08	16.96	1.12	1.10	27.66	1.62	1.50	24.2	1.37	1.58	55.27	2.66	49.8	2.27	37.62	1.79	17.9						
24	18.48	1.36	1.04	16.24	1.17	1.06	25.98	1.69	1.44	22.34	1.42	1.52	52.18	2.78	47.4	2.36	36.12	1.84	17.1						
25	17.74	1.42	1.0	15.59	1.21	1.02	24.98	1.75	1.38	21.51	1.48	1.41	48.25	2.89	45.12	2.45	34.72	1.94	16.6						
26	17.06	1.47	.96	14.43	1.26	.98	24.06	1.82	1.34	20.43	1.65	1.36	46.47	3.11	43.26	2.54	32.25	2.01	16.0						
27	16.43	1.53	.93	13.92	1.31	.94	23.19	1.88	1.29	20.43	1.65	1.31	44.81	3.22	41.82	2.63	30.09	2.08	15.4						
28	15.84	1.58	.89	13.44	1.36	.91	22.35	1.95	1.25	19.36	1.77	1.23	43.26	3.33	40.47	2.72	28.26	2.15	14.9						
29	15.29	1.64	.86	12.97	1.4	.88	21.66	2.01	1.21	18.73	1.82	1.19	41.82	3.44	39.04	2.81	26.35	2.23	14.5						
30	14.76	1.69	.84	12.57	1.45	.85	20.95	2.08	1.17	18.15	1.88	1.12	40.47	3.55	37.66	2.89	24.44	2.37	14.1						
31	14.31	1.73	.81	12.18	1.5	.82	20.29	2.14	1.14	17.6	1.88	1.09	39.04	3.66	36.21	2.99	22.58	2.51	13.7						
32	13.86	1.78	.78	11.81	1.54	.80	19.68	2.21	1.10	17.08	1.94	1.06	37.66	3.77	34.64	3.08	20.68	2.68	13.3						
33	13.06	1.86	.76	11.46	1.59	.78	18.10	2.27	1.07	16.59	1.99	1.03	36.21	3.89	33.17	3.17	18.75	2.88	12.9						
34	12.67	1.91	.74	11.14	1.64	.75	18.04	2.34	1.04	16.13	2.05	1.03	34.64	4.11	31.72	3.27	16.86	2.99	12.5						
35	12.32	1.96	.72	10.83	1.69	.73	17.55	2.4	1.01	15.7	2.11	1.03	33.17	4.22	28.84	3.36	14.9	2.88	12.2						
36	12.07	2.02	.70	10.53	1.73	.71	17.09	2.47	.99	15.28	2.17	1.03	31.72	4.33	27.37	3.46	13.0	2.76	11.9						
37	11.97	2.07	.68	10.25	1.78	.69	16.65	2.53	.96	14.89	2.22	.98	30.29	4.44	25.92	3.54	11.9	2.68	11.7						
38	11.57	2.13	.66	10	1.83	.67	16.25	2.58	.96	14.89	2.22	.98	28.84	4.55	24.44	3.64	11.9	2.68	11.7						
39	11.37																								

		LW = INCREASE IN WEIGHT OF GIRDER FOR 1/16" INCREASE IN THICKNESS OF FLANGE PLATES.													
C to C	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10" BEAM	.02	.03	.03	.03	.04	.04	.04	.04	.05	.05	.05	.05	.06	.06	.06
12" BEAM	.03	.04	.04	.04	.05	.05	.05	.05	.06	.06	.06	.06	.07	.07	.07
14" BEAM	.04	.05	.05	.05	.06	.06	.06	.06	.07	.07	.07	.07	.08	.08	.08
16" BEAM	.05	.06	.06	.06	.07	.07	.07	.07	.08	.08	.08	.08	.09	.09	.09
18" BEAM	.06	.07	.07	.07	.08	.08	.08	.08	.09	.09	.09	.09	.1	.1	.1



C TO C. DISTANCE CENTER TO CENTER OF BEARINGS IN FEET.

# PLATEGIRDERS.

## 2 P FLANGE PLATE

1 H WEB PLATE  
3/4" RIVETS

#### 4 A ANGLE IRON

13000 LBS/SQ. IN. MAX. FIBRE  
STRESS.



L	P=2x16"x3/4" B=2x20"x80ms A=7 3/4"		P=2x16"x3/4" B=2x20"x64" A=7"		P=2x18"x3/4" B=2x24"x80" A=8"	
	L	W/L	L	W/L	L	W/L
10	.03	199.67	1.22	7.22	176.72	7.34
11	.04	181.51	1.34	6.56	160.66	6.68
12	.04	166.39	1.46	6.02	147.26	6.12
13	.04	152.6	1.52	5.56	135.95	5.65
14	.05	142.64	1.73	5.16	126.72	5.18
15	.05	133.12	1.83	4.81	117.82	4.79
16	.05	124.8	1.95	4.51	110.45	4.59
17	.06	117.47	2.07	4.25	103.96	4.32
18	.06	110.94	2.19	4.01	98.18	4.06
19	.06	105.1	2.31	3.8	93.01	3.86
20	.07	99.85	2.43	3.61	88.36	3.67
21	.07	95.08	2.56	3.44	84.15	3.5
22	.07	90.77	2.68	3.28	80.33	3.34
23	.08	86.82	2.8	3.14	76.84	3.19
24	.08	83.2	2.92	3.01	73.64	3.06
25	.08	79.87	3.04	2.89	70.69	2.94
26	.09	76.8	3.16	2.78	67.97	2.82
27	.09	73.96	3.29	2.68	65.46	2.72
28	.09	71.32	3.41	2.58	63.12	2.62
29	.1	68.86	3.53	2.49	60.94	2.53
30	.1	66.56	3.65	2.41	58.91	2.45
31	.1	64.41	3.77	2.33	57.01	2.37
32	.11	62.41	3.89	2.26	55.22	2.29
33	.11	60.51	4.02	2.19	53.56	2.22
34	.11	58.73	4.14	2.12	51.92	2.16
35	.12	57.05	4.26	2.06	50.50	2.1
36	.12	55.46	4.38	2.01	49.09	2.04
37	.12	53.96	4.5	1.95	47.77	1.98
38	.13	52.54	4.62	1.9	46.51	1.93
39	.13	51.20	4.75	1.85	45.32	1.88
40	.	.	.	.	.	.
41	.	.	.	.	.	.
42	.	.	.	.	.	.
43	.	.	.	.	.	.
44	.	.	.	.	.	.





## PLATE GIRDERS. P



## PLATE BOX GIRDERS.

13000 LBS./SQ. IN. MAX. FIBRE ST'S.

TWO P FLANGE PLATES.

TWO H WEB PLATES.

FOUR A ANGLE IRONS.

H = 42"x 1/2", 36"x 1/2", 23"x 1/2", 30"x 1/2"

K = 17", 13", 10", 6"-7"

U P U	P = 2x12"x 3/8" H = 30"x 1/2" A = 4-5x3 1/2"x 1/2"				P = 2x30"x 1 1/16" H = 2x42"x 1/2" A = 4-5x4 1/2"x 1/2"				P = 2x24"x 3/8" H = 2x36"x 1/2" A = 4x4"x 3 1/2"x 1/2"				P = 2x20"x 3/8" H = 2x33"x 1/2" A = 4x3 1/2"x 3 1/2"x 1/2"				P = 2x16"x 3/8" H = 2x30"x 1/2" A = 4x3 1/2"x 3 1/2"x 1/2"			
	L	W	L	W	L	W	L	W	L	W	L	W	L	W	L	W	L	W	L	W
20	81.18	1.62	4.0	.05	248.5	3.78	15.8	.13	184.9	2.92	10.59	.11	130.2	2.44	7.95	.09	97.66	2.13	5.73	.07
21	77.32	1.69	3.8	.05	224.8	3.95	15.05	.13	176.2	3.06	10.1	.11	124	2.55	7.58	.09	92.94	2.23	5.46	.07
22	73.8	1.76	3.63	.06	202.3	4.13	14.37	.14	168.2	3.19	9.64	.11	118.3	2.66	7.22	.09	88.72	2.32	5.2	.08
23	70.6	1.86	3.47	.06	251	4.34	13.74	.15	160.8	3.39	9.22	.12	113.2	2.8	6.9	.1	84.86	2.45	4.98	.08
24	67.66	1.93	3.32	.06	240.5	4.52	13.17	.15	154.2	3.49	8.84	.12	108.5	2.91	6.62	.1	81.32	2.54	4.78	.08
25	64.95	2.01	3.19	.06	230.9	4.69	12.64	.16	148	3.63	8.48	.13	104.1	3.03	6.35	.11	78.07	2.64	4.59	.09
26	62.45	2.07	3.07	.07	222	4.87	12.16	.17	142.4	3.76	8.18	.13	100.1	3.14	6.12	.11	75.07	2.74	4.41	.09
27	60.14	2.14	2.96	.07	213.8	5.04	11.7	.17	137	3.89	7.85	.14	96.4	3.25	5.89	.12	72.29	2.83	4.25	.09
28	57.99	2.21	2.85	.07	206.2	5.21	11.29	.18	132.1	4.03	7.57	.14	93	3.36	5.67	.12	69.7	2.93	4.1	.1
29	55.99	2.31	2.75	.07	199	5.43	10.91	.19	127.6	4.15	7.31	.15	89.8	3.5	5.48	.12	67.3	3.06	3.96	.1
30	54.12	2.38	2.66	.08	195.4	5.61	10.54	.19	123.5	4.33	7.06	.15	86.8	3.61	5.29	.13	65.06	3.16	3.82	.1
31	52.38	2.45	2.57	.08	186.2	5.78	10.21	.2	119.3	4.43	6.83	.16	84	3.72	5.13	.13	62.96	3.25	3.7	.11
32	50.74	2.52	2.5	.08	180.3	5.95	9.88	.2	115.6	4.6	6.63	.16	81.4	3.83	4.97	.14	61	3.35	3.58	.11
33	49.20	2.59	2.42	.08	174.9	6.12	9.58	.21	112.1	4.74	6.43	.17	78.9	3.95	4.82	.14	59.14	3.5	3.48	.11
34	47.76	2.66	2.34	.09	169.8	6.29	9.30	.22	108.8	4.87	6.24	.17	76.6	4.06	4.67	.14	57.4	3.54	3.38	.12
35	46.39	2.73	2.28	.09	164.9	6.47	9.03	.22	105.7	5	6.06	.18	74.4	4.17	4.53	.15	55.76	3.64	3.28	.12
36	45.1	2.83	2.22	.09	160.3	6.69	8.78	.23	102.8	5.17	5.9	.18	72.3	4.31	4.41	.15	54.22	3.73	3.18	.12
37	43.88	2.90	2.16	.09	156	6.86	8.54	.24	100	5.31	5.74	.19	70.4	4.41	4.3	.16	52.73	3.86	3.09	.13
38	42.73	2.97	2.1	.1	151.9	6.94	8.32	.24	97.4	5.44	5.58	.19	68.5	4.53	4.18	.16	51.36	3.96	3.02	.13
39	41.63	3.04	2.05	.1	148	7.2	8.11	.25	94.9	5.58	5.44	.2	66.7	4.65	4.07	.17	50.04	4.05	2.94	.13
40	40.59	3.11	2	.1	144.3	7.38	7.91	.26	92.5	5.71	5.3	.2	65.1	4.76	3.97	.17	48.8	4.15	2.86	.14

## I-BEAMS USED IN FOUNDATION.

SAFE LENGTH OF PROJECTION M IN FEET FOR SPACING S = 1 FOOT AND

BEARING CAPACITY OF GROUND

B RANGING FROM 1 TO 5 TONS

PER SQ. FOOT.

BASEMENT FLOOR LINE.

16000 LBS. EXT. FIBRE ST.

FOR BEAMS.

CONCRETE.

L = WEIGHT OF WALL PER LIN. FOOT, TONS

WALL

L = R IN FEET

B = FOUNDATION

LET

L = 40, B = 2

N = 6 AND S = 1 1/2

THEREFORE: R = 32 = 20 FT.

M = 7 FEET, B = 2x1 1/2 = 3 TONS.

D	W	BEARING CAPACITY OF GROUND, TONS/SQ. FT.									
		1	1 1/4	1 1/2	2	2 1/4	2 1/2	3	3 1/2	4	4 1/2
24	80	17	14.5	13	12	11	10	10	9	8	8.5
20	80	14	12.5	11.5	10	9	9	8	7.5	7	6.5
"	65	12.5	11	10	8.5	8	8	7	6.5	6	5.5
15	80	12	10.5	9.5	8.5	8	7.5	7	6.5	6	5.5
"	60	10.5	9.5	8.5	7.5	7	6.5	6	5.5	5.5	5
"	50	9.5	8.5	8	7	6.5	6	5.5	5	4.5	4.5
"	42	8.5	8	7	6	6	5.5	5	4.5	4.5	4
12	40	8	7	6.5	5.5	5.5	5	4.5	4	4	3.5
"	32	7	6.5	6.5	5	4.5	4.5	4	4	3.5	3.5
10	33	6.5	6	5.5	4.5	4.5	4	4	3.5	3.5	3
"	25	5.5	5	4.5	4	4	3.5	3.5	3	3	2.5
9	21	5	4.5	4	3.5	3.5	3	3	2.5	2.5	2
8	18	4.5	4	3.5	3	3	3	2.5	2.5	2	2
7	15	4	3.5	3	2.5	2.5	2.5	2	2	2	1.5
6	13	3	3	2.5	2.5	2	2	2	1.5	1.5	1.5
5	10	2.5	2.5	2	2	1.5	1.5	1.5	1.5	1.5	
4	7	2	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	

SAFE LENGTH M IN FEET.







# ROOF TRUSSES.

TO FIND THE ACTUAL STRAIN IN ANY MEMBER, MULTIPLY THE COEFFICIENT GIVEN FOR THAT MEMBER BY THE SPAN IN FEET AND THE WEIGHT PER SQUARE FOOT CARRIED BY THE ROOF

LOAD ON ROOFS FOR SPANS UNDER 75 FEET,

INCLUDING WEIGHT OF TRUSS.

ROOF COVERED WITH CORRUGATED SHEETS UNBOARDED 8 LBS. ON BOARDS 11 LBS. R.C. WITH SLATE ON LATHS 13 LBS. ON BOARDS 1 1/4" THICK 16 LBS. SNOW 5 TO 12 LBS. R.C. WITH SHINGLES ON LATHS 10 LBS. IF PLASTERED BELOW WAFTERS 20 LBS.

M = MEMBER. ST. = STRAIN

L = LENGTH IN FEET

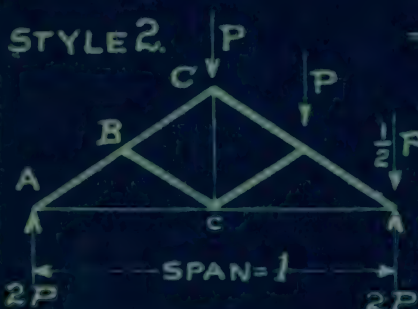
P = LOAD IN LBS. PER SQU. FOOT.

STYLE 1.



M	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	ST.	L.	ST.	L.	ST.	L.
A-B	2.704	.300463	3.354	.279509	4.039	.269258
B-C	2.149	.300463	2.907	.279509	3.668	.269258
A-b	2.250	.361110	3.000	.312500	3.750	.290000
b-c	1.500	.138390	2.000	.375000	2.500	.210000
B-b	.832	.200309	.895	.139754	.928	.107704
C-b	.750	.361110	1.000	.312500	1.250	.290000

STYLE 2.



M	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	ST.	L.	ST.	L.	ST.	L.
A-B	2.704	.300462	3.354	.279508	4.041	.269258
B-C	1.802	.300462	2.236	.279508	2.692	.269258
A-c	2.250	.500000	3.000	.500000	3.750	.500000
B-c	.901	.300462	1.118	.279508	1.347	.269258
C-c	1.000	.333333	1.000	.250000	1.000	.200000

STYLE 3.



M	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	ST.	L.	ST.	L.	ST.	L.
A-B	4.507	.200308	5.590	.186339	6.731	.179505
B-C	3.606	.200308	4.472	.186339	5.385	.179505
C-D	3.606	.200308	4.472	.186339	5.385	.179505
A-c	3.750	.333333	5.000	.333333	6.250	.333333
c-d	2.250	.166667	3.000	.166667	3.750	.166667
B-c	.901	.200308	1.118	.186339	1.346	.179505
C-c	1.000	.222222	1.000	.166667	1.000	.133333
D-c	1.667	.372678	1.803	.300463	1.953	.260341

NOTE: HEAVY LINES DENOTE COMPRESSION AND LIGHT LINES TENSION MEMBERS. LOADS CONCENTRATED AT JOINT.



## STYLE 4.



M	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	ST.	L.	ST.	L.	ST.	L.
A-B	4.506	.200308	5.590	.186339	6.732	.179505
B-C	3.952	.200308	5.143	.186339	6.360	.179505
C-D	2.774	.200308	3.801	.186339	4.828	.179505
A-b	3.750	.240340	5.000	.208333	6.250	.193333
b-c	3.000	.240340	4.000	.208333	5.000	.193333
c-d	2.250	.018520	3.000	.083333	3.750	.113333
B-b	.832	.133539	.895	.093169	.929	.071802
C-c	1.248	.267078	1.341	.186039	1.393	.143604
C-b	.750	.240740	1.000	.208333	1.250	.193333
D-c	1.040	.333848	1.265	.263523	1.486	.229879

## STYLE 5.



M	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	ST.	L.	ST.	L.	ST.	L.
A-B	4.507	.200308	5.590	.186339	6.731	.179505
B-C	4.507	.200308	5.590	.186339	6.731	.179505
C-D	3.606	.200308	4.472	.186339	5.385	.179505
A-b	3.750	.166667	5.000	.166667	6.250	.166667
b-c	3.000	.166667	4.000	.166667	5.000	.166667
c-d	2.250	.166667	3.000	.166667	3.750	.166667
B-b	1.000	.111111	1.000	.083333	1.000	.066667
C-c	1.500	.222222	1.500	.166667	1.500	.133333
C-b	1.250	.277777	1.414	.235700	1.600	.213437
D-c	1.677	.372683	1.803	.300467	1.950	.260340

## STYLE 6.



M	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	ST.	L.	ST.	L.	ST.	L.
A-B	6.310	.150281	7.826	.139754	9.424	.134629
B-C	5.755	.150231	7.379	.139754	9.053	.134629
C-D	5.200	.150231	6.932	.139754	8.682	.134629
D-E	4.645	.150231	6.485	.139754	8.311	.134629
A-b	5.250	.180555	7.000	.156250	8.750	.145000
b-c	4.500	.180555	6.000	.156250	7.500	.145000
c-d	3.000	.128890	4.000	.187500	5.000	.210000
d-e	.750	.180555	1.000	.156250	1.250	.145000
C-d	1.750	.180555	1.000	.156250	1.250	.145000
B-b	.832	.100154	.895	.069877	.928	.053852
D-d	.832	.100154	.895	.069877	.928	.053852
C-c	1.664	.200309	1.790	.139754	1.855	.107704
c-d	1.500	.180555	2.000	.156250	2.500	.145000
d-e	2.250	.180555	3.000	.156250	3.750	.145000







## STYLE 7.



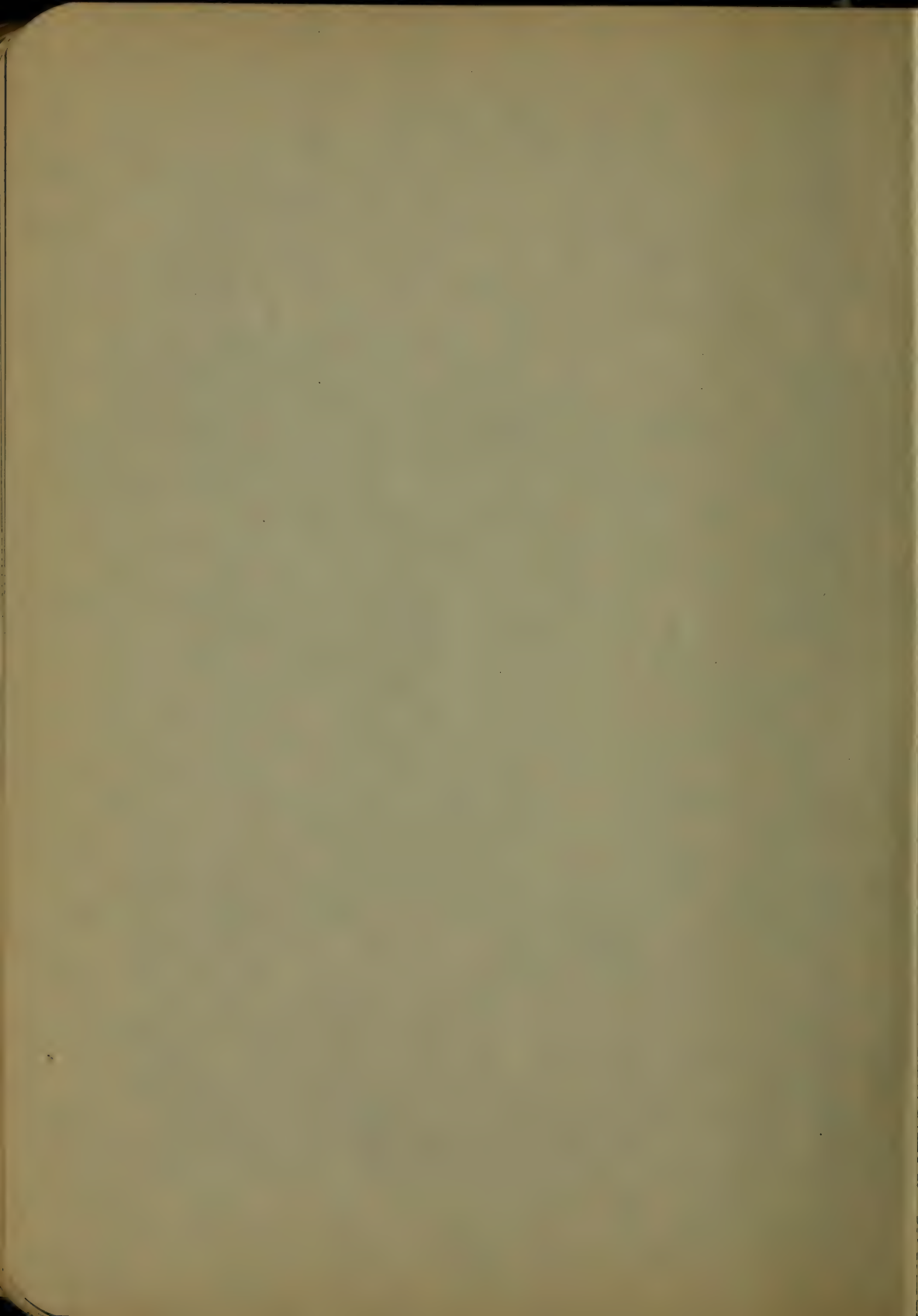
MEM- BER.	PITCH 1:3		PITCH 1:4		PITCH 1:5	
	STRAIN	LENGTH	STRAIN	LENGTH	STRAIN	LENGTH.
A-B	8.773416	.4506939	10.80766	.4192628	13.014149	.403887
B-C	8.158162	.4506939	10.36045	.4192628	12.27136	.403887
C-D	7.604016	.4506939	9.913235	.4192628	11.899977	.403887
D-E	7.049316	.4506939	9.466022	.4192628	11.528587	.403887
E-F	5.000000	1.0000000	6.66666	1.000000	8.333333	1.000000
A-b	7.25000	.5416666	9.66666	.468750	12.083333	.435000
b-c	6.50000	.5416666	8.66666	.468750	10.833333	.435000
c-e	5.00000	.4166666	6.66666	.352500	8.333333	.330000
e-f	5.00000	.000000	6.66666	.000001	8.333333	.000001
B-b	.8320504	.3004626	.894427	.209632	.928477	.1801245
C-c	1.6641008	.6009252	1.788854	.419263	1.856953	.360249
D-d	.8320504	.3004625	.894427	.209628	.928472	.1801245
E-e	.0000001	1.000000	.000001	.750000	.000001	.600000
C-b	.7500000	.5416666	1.000000	.468750	1.250000	.435000
C-d	.7500000	.5416666	1.000000	.468750	1.250000	.435000
E-d	2.250000	.5416666	3.000000	.468750	3.750000	.435000
c-d	1.50000	.5416666	2.00000	.468750	2.50000	.435000

FOR SNOW AND WIND ADD 30 LBS. PER SQ. FOOT TO THE DEADLOAD ON ROOFS AND FOR SPANS OVER 75 FEET INCREASE THE DEADLOAD BY 4 LBS. PER SQ. FOOT.

# SAFE LOAD IN TONS OF 2000 LBS. FOR HOLLOW ROUND CAST IRON COLUMNS WITH SQUARE ENDS.

WITH SQUARE ENDS.																													
DIAMETER IN INCHES	THICK- NESS IN INCHES	LENGTH OF COLUMN IN FEET										AREA OF METAL INCH.	WEIGHT PER FOOT LENGTH	D	T	LENGTH OF COLUMN IN FEET										AREA OF METAL SQ. INCH	WEIGHT PER FOOT LENGTH		
		6	8	10	12	14	16	18	20	22	24					14	16	18	20	22	24	26	28	30	32				
6	3/4	52	47	41	36	31	27	24	21	18	16	12.4	38.7	16	1 1/2	300	290	278	267	255	243	.	.	.	.	68.3	213.5		
"	7/8	60	53	47	41	36	31	27	23	21	18	14.1	44	"	1 3/8	322	311	299	286	273	261	.	.	.	.	73.4	229.8		
"	2	65	60	54	48	43	38	34	30	27	24	14.7	46	"	1 1/2	344	332	319	306	292	279	.	.	.	.	78.3	241.8		
"	2 1/8	74	68	62	55	49	43	38	34	30	27	16.8	52.6	"	1 5/8	410	395	380	363	347	332	.	.	.	.	83.6	261.2		
"	2 3/8	78	72	67	61	55	50	45	40	36	33	17.1	53.4	"	1 3/4	377	366	354	342	329	317	304	298	279	266	89.3	279.2		
"	2 1/2	89	83	76	70	63	57	51	46	41	37	19.6	61.2	"	1 7/8	403	391	379	365	352	339	325	318	298	285	95	296.8		
"	3	100	93	86	79	71	64	58	52	47	42	22.2	68.7	"	2	428	416	402	389	374	360	345	339	317	303	100.5	314.2		
"	3 1/8	103	98	91	85	80	71	65	59	54	49	22.3	69.2	"	2 1/8	453	444	426	411	396	381	365	358	335	320	106.8	333.6		
"	3 1/2	117	110	103	95	90	80	73	67	61	55	25.1	78.5	"	2 3/8	491	479	466	452	438	424	409	395	380	365	113.1	353.4		
"	3 3/8	124	122	114	105	99	89	81	74	67	61	27.5	87	"	2 1/2	520	507	494	479	464	449	434	418	402	387	115.7	372.8		
"	3 1/2	133	127	120	112	105	97	89	82	76	69	28.3	88.4	"	2 3/4	558	545	521	506	490	474	457	441	425	408	118.3	392.7		
"	3 3/4	147	141	133	125	116	107	99	91	84	77	31.4	98	"	2 3/8	615	602	581	563	547	531	514	498	481	465	132.9	415.3		
"	3 1/2	161	154	146	136	127	118	109	100	92	84	34.4	107.4	"	2 1/4	651	637	615	593	575	558	540	523	506	489	139.6	436.3		
"	3 3/4	149	143	137	129	122	114	106	98	91	85	31.4	98.2	"	2 1/2	688	676	655	634	614	594	576	558	540	523	506	146.6	454.4	
"	3 1/2	165	159	152	144	135	126	118	109	101	94	34.9	109.1	"	2 3/4	724	712	690	668	648	627	607	587	567	547	529	153.7	480.4	
"	3 3/4	182	175	167	158	148	139	129	120	111	103	38.3	119.7	"	2 3/8	760	747	724	701	681	661	641	621	601	581	561	161.4	504.2	
"	3 1/2	197	190	181	171	161	151	140	130	121	112	41.6	129.9	"	2 3/8	798	786	763	739	714	689	664	639	614	589	564	167.9	524.6	
"	3 3/4	202	195	188	179	170	160	150	141	132	123	42.2	131.9	"	2 3/8	838	825	801	777	752	727	702	677	652	627	602	176.3	550.9	
"	3 1/2	220	212	204	194	184	174	163	153	143	133	45.9	143.4	"	2 1/2	877	864	840	814	789	764	739	714	689	664	639	184.6	576.8	
"	3 3/4	237	229	220	210	199	187	176	165	154	144	49.5	154.6	"	2 3/8	915	903	879	854	829	804	779	754	729	704	679	191.2	597.5	
"	3 1/2	202	194	186	176	165	154	143	133	123	113	42	131.2	"	2 1/4	953	941	917	892	867	842	817	792	767	742	717	200.3	625.9	
"	3 3/4	221	216	209	200	191	181	170	162	152	143	46.1	144.2	"	2 3/8	1001	989	974	953	928	903	878	853	828	803	778	209.3	653.9	
"	3 1/2	242	235	227	218	208	197	187	176	166	156	50.2	156.9	"	2 1/2	1039	1027	1014	1000	985	968	951	934	915	896	876	216	575	625.9
"	3 3/4	261	254	245	235	224	213	201	190	179	168	54.2	169.4	"	2 3/8	1086	1074	1060	1045	1029	1012	994	976	957	937	917	225.8	705.5	
"	3 1/2	282	275	266	256	245	234	223	212	201	190	58.9	180.4	"	2 1/4	1133	1120	1105	1090	1074	1056	1037	1018	998	977	957	235.4	735.7	
"	3 3/4	306	299	290	280	269	258	247	236	225	214	63.5	192.4	"	2 3/8	1171	1159	1146	1131	1116	1100	1081	1062	1042	1022	1002	245.2	757.7	
"	3 1/2	327	320	311	301	290	279	268	257	246	235	68.3	209.5	"	2 3/4	1209	1195	1181	1164	1147	1129	1111	1091	1071	1051	1031	252.7	789.7	
"	3 3/4	354	347	337	327	315	302	288	276	263	251	72.8	231.1	"	2 3/8	1259	1244	1229	1212	1194	1176	1156	1136	1115	1095	1075	263.1	822.1	
"	3 1/2	375	368	358	348	336	324	312	300	288	276	77.6	243.1	"	2 1/4	1310	1295	1280	1263	1245	1226	1206	1185	1164	1144	1124	270	854.1	
"	3 3/4	402	395	385	375	363	351	339	327	315	303	82.4	253.1	"	2 3/8	1361	1346	1331	1314	1296	1277	1257	1236	1215	1195	1175	281.1	872.5	
"	3 1/2	423	416	406	396	384	372	360	348	336	324	87.6	263.1	"	2 3/4	1418	1403	1388	1371	1353	1334	1314	1293	1272	1252	1232	292.2	913	897.7
"	3 3/4	454	447	437	427	415	403	391	379	367	355	92.8	273.1	"	2 3/8	1471	1456	1441	1424	1406	1387	1367	1346	1325	1305	1285	303.3	944.1	917.9









HEAD IN FEET.

PRESSURE IN POUNDS PER SQ. IN.

## PRESSURE OF WATER.

FROM 1 TO 100 FEET.

WATER DISTILLED AT 32° F. AND 30 INCH. BAROMETER WEIGHT :  
 62.47 LBS. PER CUB. FOOT. AT 62° F. & 30" B. IT WEIGHS 62.355 LBS.  
 AND AT 32° F. & 30" B. 59.7 LBS. PER CUB. FOOT. SEA WATER WEIGHS  
 64.02 LBS. PER CUB. FT. AT 1.028 SPECIFIC GRAVITY.

H	P	H	P	H	P	H	P	H	P	H	P
FT.	INCHES.	FT.	INCHES.	FT.	INCHES.	FT.	INCHES.	FT.	INCHES.	FT.	INCHES.
1	1.43	51	22.09	101	44.61	151	67.14	201	89.66	251	112.19
2	1.36	52	22.52	104	45.03	156	67.57	208	90.10	261	112.62
3	1.30	53	22.95	105	45.43	157	68.0	209	90.53	262	113.05
4	1.23	54	23.39	106	45.81	158	68.43	210	90.96	263	113.48
5	2.16	55	23.82	107	46.24	159	68.87	211	91.39	264	113.91
6	2.19	56	24.25	108	46.78	160	69.31	212	91.83	265	114.34
7	3.03	57	24.69	109	47.21	161	69.74	213	92.26	266	114.77
8	3.46	58	25.12	110	47.64	162	70.17	214	92.69	267	115.20
9	3.89	59	25.55	111	48.08	163	70.61	215	93.12	268	115.63
10	4.31	60	25.98	112	48.51	164	71.04	216	93.56	269	116.06
11	4.76	61	26.42	113	48.94	165	71.47	217	93.99	270	116.49
12	5.20	62	26.85	114	49.38	166	71.91	218	94.43	271	116.92
13	5.63	63	27.29	115	49.81	167	72.34	219	94.86	272	117.35
14	6.06	64	27.72	116	50.24	168	72.77	220	95.30	273	117.78
15	6.49	65	28.15	117	50.68	169	73.20	221	95.73	274	118.21
16	6.93	66	28.58	118	51.11	170	73.64	222	96.16	275	118.64
17	7.36	67	29.02	119	51.54	171	74.07	223	96.60	276	119.07
18	7.79	68	29.45	120	51.98	172	74.50	224	97.03	277	119.50
19	8.22	69	29.88	121	52.41	173	74.94	225	97.46	278	119.93
20	8.64	70	30.32	122	52.84	174	75.37	226	97.90	279	120.36
21	9.09	71	30.75	123	53.28	175	75.80	227	98.33	280	120.79
22	9.53	72	31.18	124	53.71	176	76.23	228	98.76	281	121.22
23	9.96	73	31.62	125	54.15	177	76.67	229	99.2	282	121.65
24	10.39	74	32.05	126	54.58	178	77.10	230	99.63	283	122.08
25	10.82	75	32.48	127	55.01	179	77.53	231	100.06	284	122.51
26	11.26	76	32.92	128	55.44	180	77.97	232	100.49	285	122.94
27	11.69	77	33.35	129	55.88	181	78.4	233	100.93	286	123.37
28	12.12	78	33.78	130	56.31	182	78.84	234	101.36	287	123.80
29	12.55	79	34.21	131	56.74	183	79.27	235	101.79	288	124.23
30	12.99	80	34.65	132	57.18	184	79.70	236	102.23	289	124.66
31	13.42	81	35.08	133	57.61	185	80.14	237	102.66	290	125.09
32	13.86	82	35.52	134	58.04	186	80.57	238	103.09	291	125.52
33	14.29	83	35.95	135	58.48	187	81.0	239	103.53	292	125.95
34	14.72	84	36.39	136	58.91	188	81.43	240	103.96	293	126.38
35	15.16	85	36.82	137	59.34	189	81.87	241	104.39	294	126.81
36	15.59	86	37.26	138	59.77	190	82.30	242	104.83	295	127.24
37	16.02	87	37.69	139	60.21	191	82.73	243	105.26	296	127.67
38	16.45	88	38.13	140	60.64	192	83.17	244	105.69	297	128.10
39	16.88	89	38.56	141	61.07	193	83.6	245	106.13	298	128.53
40	17.32	90	39.0	142	61.51	194	84.03	246	106.56	299	128.96
41	17.75	91	39.43	143	61.94	195	84.47	247	107.0	300	129.39
42	18.19	92	39.87	144	62.37	196	84.9	248	107.43	301	129.82
43	18.62	93	40.3	145	62.81	197	85.33	249	107.86	302	130.25
44	19.05	94	40.75	146	63.24	198	85.76	250	108.3	303	130.68
45	19.49	95	41.18	147	63.67	199	86.2	251	108.73	304	131.11
46	19.92	96	41.62	148	64.1	200	86.63	252	109.16	305	131.54
47	20.35	97	42.05	149	64.54	201	87.07	253	109.59	306	131.97
48	20.79	98	42.49	150	64.97	202	87.5	254	110.03	307	132.4
49	21.22	99	42.92	151	65.4	203	87.93	255	110.46	308	132.83
50	21.65	100	43.35	152	65.84	204	88.36	256	110.89	309	133.26
		101	43.78	153	66.27	205	88.8	257	111.32	310	133.69
		102	44.21	154	66.7	206	89.23	258	111.76	311	134.12
								259	112.19	312	134.55



# THEORETICAL HORSE POWER REQUIRED TO RAISE WATER

TO DIFFERENT HEIGHTS.

THE THEORETICAL HORSE POWER GIVEN IN TABLE IS REDUCED BY LOSS DUE TO FRICTIONS IN PIPES, MOTORS, TURBINES, PUMPS, GEARS, BELTS ETC FROM 35% TO 45%.

GALLONS PER MINUTE = G.

G.	5	10	15	20	25	30	35	40	45	50	60	75	90	100	125	150	175	200	250	300	350	400	G.
5	.006	.012	.019	.025	.031	.037	.044	.050	.057	.062	.075	.093	.112	.125	.156	.187	.224	.260	.312	.375	.437	.500	5
10	.018	.037	.056	.075	.094	.112	.131	.15	.17	.19	.24	.28	.33	.37	.46	.55	.64	.73	.89	1.06	1.23	1.40	10
15	.019	.037	.056	.075	.094	.112	.131	.15	.17	.19	.24	.28	.33	.37	.46	.55	.64	.73	.89	1.06	1.23	1.40	15
20	.025	.050	.075	.100	.125	.150	.175	.20	.23	.26	.32	.37	.43	.49	.59	.70	.82	.94	1.08	1.25	1.42	1.59	20
25	.031	.062	.093	.125	.156	.187	.224	.26	.30	.34	.41	.46	.52	.58	.70	.82	.94	1.08	1.25	1.42	1.59	1.77	25
30	.037	.075	.112	.150	.187	.224	.260	.30	.34	.37	.46	.52	.59	.67	.80	.93	1.06	1.23	1.40	1.57	1.74	1.91	30
35	.044	.087	.131	.175	.219	.262	.306	.35	.39	.44	.53	.59	.67	.75	.88	1.01	1.14	1.28	1.45	1.61	1.78	1.94	35
40	.050	.100	.150	.200	.250	.300	.350	.40	.45	.50	.60	.67	.76	.84	.99	1.14	1.29	1.46	1.64	1.81	1.98	2.15	40
45	.056	.112	.168	.225	.281	.337	.394	.45	.51	.56	.67	.76	.86	.94	1.09	1.24	1.40	1.57	1.75	1.92	2.10	2.27	45
50	.062	.125	.187	.250	.312	.375	.437	.50	.56	.62	.73	.82	.93	1.02	1.17	1.32	1.47	1.64	1.81	1.98	2.15	2.32	50
60	.075	.150	.225	.300	.375	.450	.525	.60	.67	.75	.87	.97	1.08	1.17	1.34	1.50	1.66	1.83	2.00	2.17	2.34	2.51	60
75	.093	.187	.281	.375	.469	.562	.656	.75	.84	.94	1.08	1.22	1.36	1.49	1.69	1.87	2.05	2.23	2.41	2.59	2.77	2.94	75
90	.112	.225	.337	.450	.562	.675	.787	.90	1.01	1.12	1.28	1.44	1.60	1.75	1.89	2.03	2.17	2.30	2.42	2.54	2.65	2.76	90
100	.125	.250	.375	.500	.625	.750	.875	1.00	1.12	1.25	1.41	1.57	1.73	1.88	2.02	2.15	2.28	2.40	2.51	2.62	2.72	2.82	100
125	.156	.312	.469	.625	.781	.937	1.094	1.25	1.41	1.57	1.77	1.97	2.17	2.36	2.54	2.71	2.88	3.04	3.19	3.33	3.46	3.57	125
150	.187	.375	.562	.750	.937	1.125	1.312	1.50	1.69	1.87	2.10	2.31	2.52	2.72	2.91	3.09	3.27	3.44	3.60	3.75	3.89	4.01	150
175	.219	.437	.656	.875	1.094	1.312	1.531	1.75	1.97	2.19	2.44	2.68	2.91	3.13	3.34	3.54	3.73	3.91	4.08	4.24	4.39	4.51	175
200	.250	.500	.750	1.000	1.250	1.500	1.750	2.00	2.25	2.50	2.77	3.04	3.30	3.55	3.79	4.02	4.24	4.45	4.65	4.84	5.02	5.19	200
250	.312	.625	.937	1.250	1.562	1.875	2.187	2.500	2.812	3.125	3.437	3.750	4.062	4.375	4.687	5.000	5.312	5.625	5.937	6.250	6.562	6.875	250
300	.375	.750	1.125	1.5	1.875	2.250	2.625	3.000	3.375	3.750	4.125	4.500	4.875	5.250	5.625	6.000	6.375	6.750	7.125	7.500	7.875	8.250	300
350	.437	.875	1.312	1.75	2.187	2.625	3.062	3.5	3.94	4.37	4.85	5.32	5.79	6.25	6.71	7.17	7.63	8.09	8.54	9.00	9.45	9.90	350
400	.500	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000	6.500	7.000	7.500	8.000	8.500	9.000	9.500	10.000	10.500	11.000	400
500	.625	1.250	1.875	2.5	3.125	3.750	4.375	5.000	5.625	6.250	6.875	7.500	8.125	8.750	9.375	10.000	10.625	11.250	11.875	12.500	13.125	13.750	500
600	.750	1.500	2.250	3.0	3.750	4.500	5.250	6.000	6.750	7.500	8.250	9.000	9.750	10.500	11.250	12.000	12.750	13.500	14.250	15.000	15.750	16.500	600
800	1.000	2.000	3.000	4.0	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000	16.000	17.000	18.000	19.000	20.000	21.000	22.000	800
900	1.125	2.250	3.405	4.5	5.625	6.750	7.875	9.000	10.125	11.250	12.375	13.500	14.625	15.750	16.875	18.000	19.125	20.250	21.375	22.500	23.625	24.750	900
1000	1.25	2.5	3.75	5	6.25	7.5	8.75	10	11.25	12.5	13.75	15	16.25	17.5	18.75	20	21.25	22.5	23.75	25	26.25	27.5	1000
1200	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21	22.5	24	25.5	27	28.5	30	31.5	33	1200











# LAP-WELDED CHARCOAL IRON BOILER TUBES AND LAP-WELDED SEMI-STEEL LOCOMOTIVE TUBES.

## BOILER TUBES.

## LOCOMOTIVE TUBES.

NOMINAL WEIGHT PER FOOT.	LENGTH OF TUBE PER SQ. FOOT OF SURF.		INTER- NAL SURF.	NEAREST WIRE GAUGE.	THICKNESS METAL INCHES.	DIAMETER		INTERNAL INCHES.	THICKNESS METAL INCHES.	WIRE GAUGE.	LENGTH OF TUBE PER SQ. FOOT OF SURF.	INTER- NAL SURF.	NEAREST WIRE GAUGE.	THICKNESS METAL INCHES.	NOMINAL WEIGHT PER FOOT.
.90	3.819	4.462	13	.095	.856	1		.834	.083	14	4.58	3.82	.81		
1.15	3.056	3.463	13	.095	1.106	1 1/4		1.084	.083	14	3.524	3.056	1.03		
1.40	2.547	2.863	13	.095	1.334	1 1/2		1.31	.095	13	2.916	2.546	1.42		
1.66	2.183	2.448	13	.095	1.56	1 3/4		1.532	.109	12	2.493	2.183	1.91		
1.91	1.909	2.11	13	.095	1.81	2		1.782	.109	12	2.144	1.91	2.2		
2.16	1.698	1.854	13	.095	2.06	2 1/4		2.032	.109	12	1.88	1.698	2.49		
2.75	1.528	1.676	12	.109	2.282	2 1/2		2.26	.12	11	1.69	1.528	3.05		
3.04	1.389	1.509	12	.109	2.532	2 3/4		2.51	.12	11	1.522	1.389	3.27		
3.33	1.273	1.373	12	.109	2.782	3		2.76	.12	11	1.384	1.273	3.68		
3.96	1.175	1.26	11	.12	3.01	3 1/4									
4.28	1.091	1.172	11	.12	3.26	3 1/2									
4.6	1.018	1.088	11	.12	3.51	3 3/4									
5.47	.955	1.024	10	.134	3.732	4									
6.17	.849	.902	10	.134	4.232	4 1/2									
7.58	.764	.812	9	.148	4.704	5									
10.16	.637	.673	8	.145	5.67	6									
11.9	.546	.573	8	.165	6.67	7									
13.65	.477	.498	8	.165	7.67	8									
16.76	.424	.442	7	.19	8.64	9									
21.0	.382	.398	6	.203	9.594	10									
25.03	.347	.362	5	.22	10.56	11									
28.46	.319	.33	4 1/2	.229	11.542	12									
32.06	.294	.305	4	.238	12.524	13									
36.0	.273	.283	3 1/2	.248	13.504	14									
40.60	.254	.264	3	.259	14.482	15									
45.20	.239	.248	2 1/2	.270	15.432	16									

## STANDARD WROUGHT IRON NIPPLES.

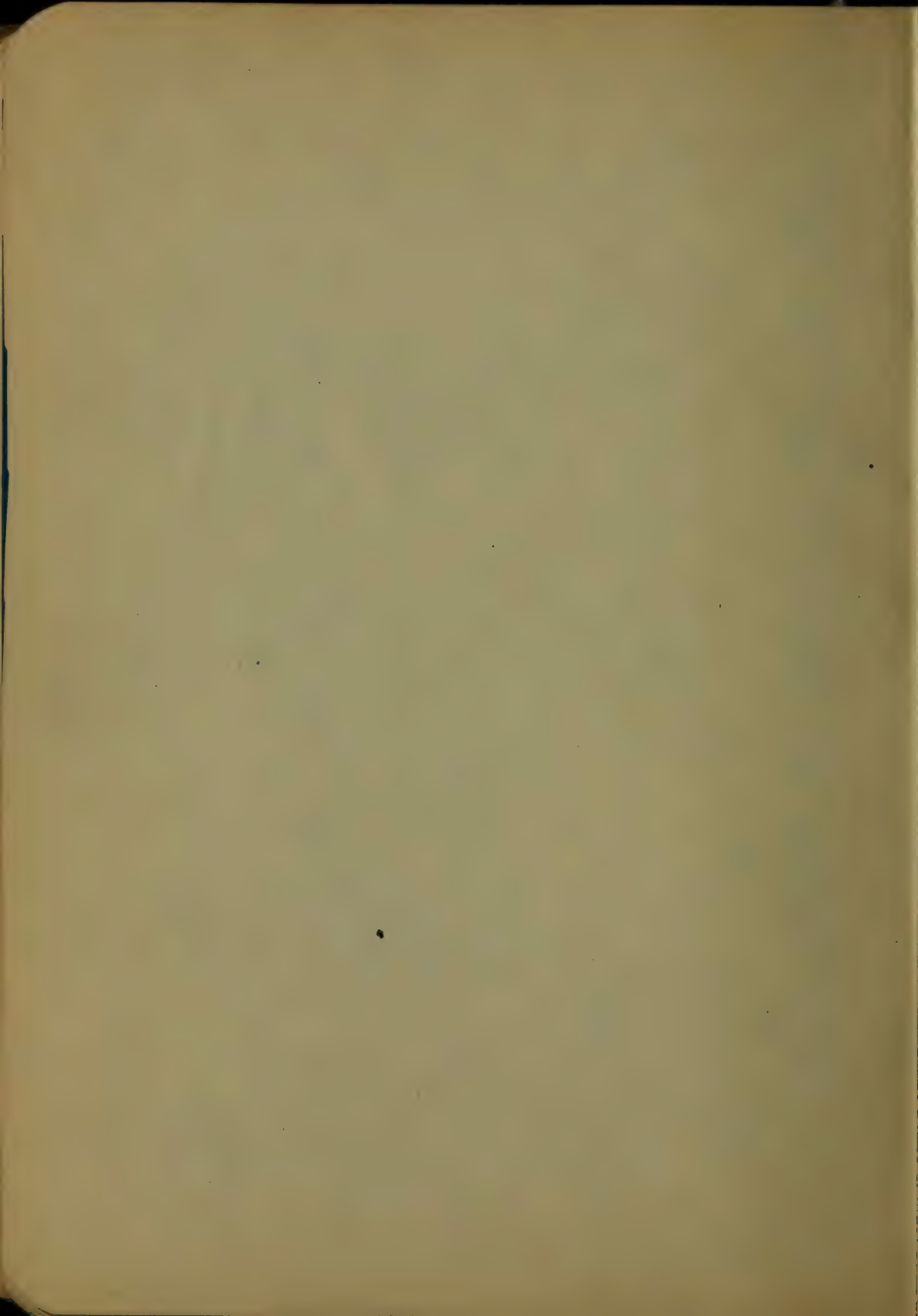
CLOSE. SHOULDER CLOSE-C SHORT-S LONG-L

NOM. DIAM. INCH.	LENGTH IN INCHES.								EXTRA L.
	C.	S.	LONG.						
1/8	3/4	1 1/2	2	2 1/2	3	3 1/2	4	EXTRA LONG NIPPLES FROM 4 TO 12 INCHES. FOR ALL SIZES.	
1/4	7/8	"	"	"	"	"	"		
3/8	1	"	"	"	"	"	"		
1/2	1 1/8	"	"	"	"	"	"		
3/4	1 3/8	2	2 1/2	3	3 1/2	4	"		
1	1 1/2	2	"	"	"	"	"		
1 1/4	1 5/8	2 1/2	3	3 1/2	4	4 1/2	"		
1 1/2	1 3/4	"	"	"	"	"	"		
2	2	"	"	"	"	"	"		
2 1/2	2 1/2	"	3 1/2	4	4 1/2	5	"		
3	2 3/4	3	"	"	"	"	"		
3 1/2	3	3	4 1/2	5	5 1/2	6	"		
4	3	4	"	"	"	"	"		
4 1/2	3 1/2	4	"	"	"	"	"		
5	3 3/2	4 1/2	"	"	6	6 1/2	"		
6	4	4 1/2	5	5 1/2	6	6 1/2	"		
7	4 1/2	5	6	7	8	8	"		
8	5	6	7	8	9	10	"		
10	7 1/2	8 1/2	10	11	12	13	"		
12	9	10	11	12	13	14	"		

## STANDARD WROUGHT IRON BENDS.

SIZE OF EX. PIPE.	RETURN.		GOOSENECK.		QUART. ER.	
	A	B	C	D	E	F
3/4	4	3 1/2	2 to 5	5	5	5
1 1/4	6	6	3 to 6	6	6	6
2	8	8	4 to 8	8	8	8

EXTRA LONG NIPPLES FROM 4 TO 12 INCHES.  
FOR ALL SIZES.







INSERTED JOINT.



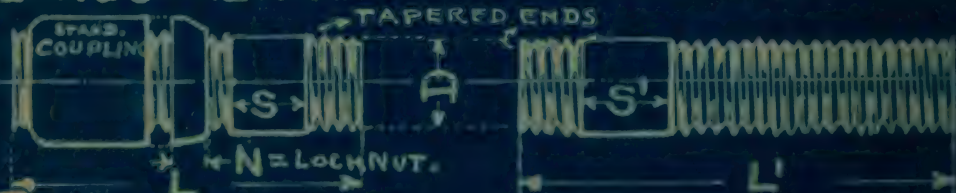
NO. OF THREADS PER INCH

W=WEIGHT IN LBS. PER FOOT.

D = NOMINAL B INSIDE DIAM.

D	D'	N°	W	A	B	C	E	D	D'	N°	W	A	B	C	E
2	2¼	14	2.22	2¾	3¼	1½	258	558	6	14	10.46	6¼	458	2¼	6¾
2¼	2½	14	2.82	"	358	"	"	558	6	11½	12.04	"	"	"	"
2½	2¾	14	3.13	358	358	1¾	358	558	6	11½	14.2	"	"	"	"
2¾	3	14	3.45	"	358	"	358	558	6	11½	16.7	"	"	"	"
3	3¼	14	4.10	4	358	"	358	6¼	658	14	11.58	738	"	2½	7½
3¼	3½	14	4.45	"	358	"	358	6¼	658	15	13.32	"	"	"	"
3½	3¾	14	4.78	458	3¾	"	4	6¼	658	11½	17.02	"	"	"	"
3¾	4	14	5.56	"	4½	"	4½	658	7	14	12.34	"	"	"	7¾
4	4¼	14	6	5½	4½	2	458	658	7	11½	17.51	"	"	"	"
4¼	4½	14	6.36	"	4½	"	4½	7½	758	14	13.55	838	6¼	"	8½
4½	4½	14	9.38	"	4½	"	"	758	8	11½	15.41	"	"	"	838
4½	4¾	14	7.8	5½	4½	"	5½	758	8	11½	20.17	"	"	"	"
4½	4¾	14	8.2	"	4½	"	"	8¼	858	11½	16.07	9½	6½	2¾	9
4¾	5	14	9.39	6¼	458	"	5¾	8¼	858	11½	20.1	"	"	"	"
5	5¼	14	8.3	"	458	"	5¾	8¼	858	11½	24.38	"	"	"	"
5	5¼	14	9.86	"	458	"	5¾	858	9	11½	17.60	"	"	"	9½
5	5½	11½	12.8	"	458	"	"	958	10	11½	21.90	10½	"	"	10½
5	5½	11½	15.88	"	458	"	"	1058	11	11½	26.78	11½	"	3	11½
5¾	558	14	8.62	"	458	2¼	588	1158	12	11½	30	12½	"	3¼	1258
558	558	11½	12.49	"	458	"	6	12½	13	11½	33.78	14	"	3½	1358

STANDARD  
LONG SCREWS. LOCKNUT NIPPLES.



LN 675

$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	2"	$2\frac{1}{2}$ "	3"	$3\frac{1}{2}$ "	4"
$3\frac{1}{2}$ "	4"	$4\frac{1}{2}$ "	5"	$5\frac{1}{2}$ "	6"	$6\frac{1}{2}$ "	7"	$7\frac{1}{2}$ "	8"	$8\frac{1}{2}$ "	9"
$\frac{1}{4}$ "	$\frac{7}{16}$ "	$\frac{5}{8}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "	1"	1"	$1\frac{1}{8}$ "	$1\frac{1}{8}$ "
$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "	1"	$1\frac{3}{8}$ "	$1\frac{3}{4}$ "	2"	$2\frac{3}{8}$ "	$2\frac{3}{4}$ "	3"	$3\frac{3}{8}$ "
$3\frac{3}{4}$ "	$10\frac{5}{8}$ "	$1\frac{1}{2} \times 6$ "	$2 \times 6$ "	6"	6"	6"	6"	6"	6"	+	+
$1\frac{1}{2} \times 10$ "	$1\frac{1}{2} \times 10$ "	$1\frac{1}{2} \times 10$ "	$1\frac{1}{2} \times 10$ "	2"	2"	2"	2"	$2\frac{1}{2}$ "	$2\frac{1}{2}$ "	+	+

## SPIRAL RIVETED-FLANGED PRESSURE

SHEET IRON.

PIPES.

OR STEEL.

MADE IN 20 FOOT LENGTHS OR LESS, GALVANIZED, TESTED  
TO 150 LBS. HYDRAULIC PRESSURE TO THE SQ. INCH.  
350

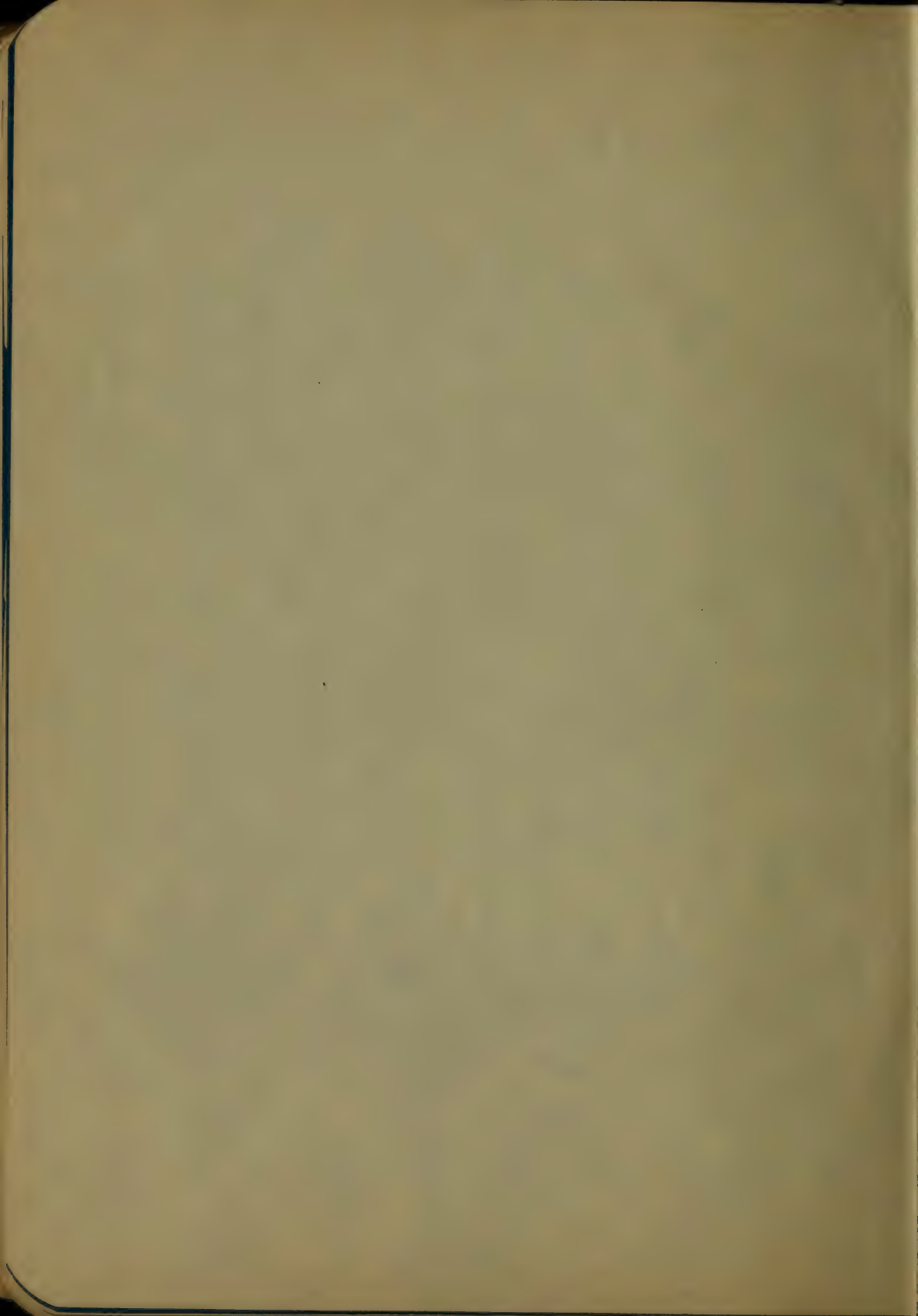


INSIDE DIAMETER	THICKNESS OF PIPE		WEIGHT PER FOOT OF PIPE	FLANGES		DIAM. OF BOLT OR	DIAM. OF BOLTS	NUMBER OF BOLTS	REMARKS
	DIAM. GAUGE	INCHES		DIAM. INCH.	THICK- NESS				
3	N <sup>o</sup> 20	.035	135.24	9	1 1/8	6 5/8	5/8	8	
4	" 20	.035	3	10	1 1/4	7 3/8	3/4	8	
5	" 20	.035	4.3	11	1 3/8	9 1/4	3/4	8	
6	" 18	.049	5.2	13	1 3/8	10 5/8	7/8	8	
7	" 18	.049	6.2	14	1 3/8	11 3/8	7/8	12	
8	" 18	.049	7.4	15	1 1/2	13	7/8	12	
9	" 18	.049	8.4	16	1 5/8	14	7/8	12	
10	" 16	.065	11.5	17 1/2	1 5/8	15 1/4	1	12	
11	" 16	.065	12.1	18 3/4	1 3/4	16 1/2	1	12	
12	" 16	.065	14	20	1 3/8	17 3/4	1	16	
13	" 16	.065	15.5	21 1/2	2	19	1	16	
14	" 14	.083	20	23	2	20 1/4	1	16	
15	" 14	.083	22.1	24	2 1/8	21 3/8	1	16	
16	" 14	.083	24	25	2 1/4	22 3/8	1	16	
18	" 14	.083	29.1	27 1/2	2 5/8	25	1	24	
20	" 14	.083	34	29	2 3/8	26 1/4	1 1/8	24	
22	" 12	.109	40.2	31	2 9/16	28 1/2	1 1/8	24	
24	" 12	.109	50.5	34	2 11/16	31 1/4	1 1/4	24	

DIAMETERS FROM 3" TO 12" ARE SINGLE RIVETED AND FROM  
12" UPWARD DOUBLE RIVETED.

COMPARATIVE SIZES OF STEAM-WATER & GAS  
PIPES. DOUBLE EXTRA HEAVY XX.STANDARD ST.  
EXTRA HEAVY X.









STEAM. PIPE FITTINGS. WATER & GAS.  
DIMENSIONS OF STANDARD CAST IRON SCREW FITTINGS  
ELBOW. TEE. CROSS. 45° ELBOW. 45° Y BEND

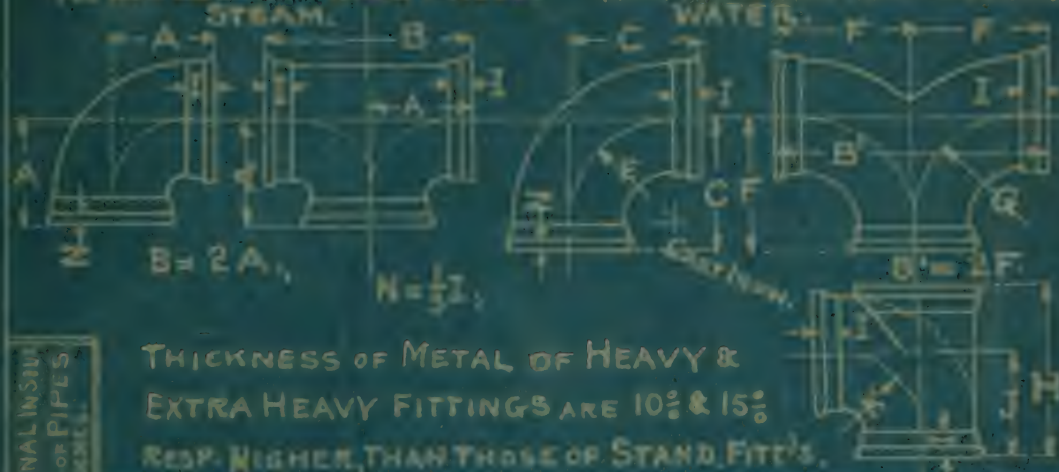
## MALLEABLE IRON SCREW FITTINGS.

THREADS PER INCH.		DRILL SIZE		DEPTH OF TAP IN INCHES		PRESSURE FOR LAST INCH 75 LBS. MALL INCH 200 LBS. FOR 50 INCH.										THICKNESS METAL IN	
		TAP		TAP		H = 2A on 2A' L = 1 1/2											
						A	A'	B	C	E	F	G	I	J	T	T'	
PIPER WITH IN INCHES.																	
1/8	27	3/32	3/32	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	
1/8	18	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	
3/16	18	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	
1/4	14	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	
1/4	14	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	
3/8	11	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	
1/2	11	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
3/4	8	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	
1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1 1/8	7	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	
1 1/4	7	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	
1 1/2	6	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	
3/4	5	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	
2	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
2 1/8	4	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	
2 1/4	4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	
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3 1/4	2	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	
3 1/2	2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	
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7 1/4	2	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4	
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8 3/4	2	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	
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9 1/4	2	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	9 1/4	
9 1/2	2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	9 1/2	
9 3/4	2	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	9 3/4	
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12 1/2	2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	12 1/2	
12 3/4	2	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	
13	2	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	
13 1/8	2	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	13 1/8	
13 1/4	2	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	13 1/4	
13 1/2	2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	
13 3/4	2	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	13 3/4	
14	2	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
14 1/8	2	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	
14 1/4	2	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14 1/4	14	

# HEAVY CAST AND MALLEABLE IRON SCREW FITTINGS.

THE 250 LBS. WORKING PRESSURE

FROM 150 TO 800 LBS. PRESSURE



THICKNESS OF METAL OF HEAVY &  
EXTRA HEAVY FITTINGS ARE 10% & 15%  
RESP. HIGHER, THAN THOSE OF STAND. FITTINGS.

NOMINAL INSIDE  
DIAM. OF PIPES

	A	C	E	F	G	H	I	J	K	L	M
1	1 1/8	2 1/8	1 3/8	2 1/2	1 7/8	3 5/8	4 1/8	2 1/2	1 3/8	1 5/8	1 3/8
1 1/4	2	3 1/8	2 1/4	3 1/8	2 1/2	4 1/2	5 1/8	3 1/8	2 3/8	2 1/4	1 3/2
1 1/2	2 1/2	3 3/8	2 3/4	3 3/8	3	5 1/4	6 1/8	3 3/8	3	2 3/4	1 5/8
2	3	4 1/8	3 1/2	4 1/8	3 3/8	6 1/4	7 1/8	4 1/8	3 3/8	3 1/4	1 5/4
2 1/4	3 1/4	4 3/8	3 3/4	5 1/8	4 1/4	6 3/4	7 3/8	4 3/8	3 3/4	3 1/2	2 3/4
2 1/2	3 1/2	4 3/4	3 3/4	5 3/8	4 1/2	6 3/4	7 3/8	4 3/8	3 3/4	3 1/2	2 3/4
3	4	5 1/8	4 1/4	6	5	7 1/2	8 1/8	5 1/8	4 1/4	4 1/4	2 3/4
3 1/4	4 1/4	5 3/8	4 3/4	6 1/4	5 1/4	7 3/4	8 3/8	5 3/8	4 3/4	4 3/4	2 3/4
3 1/2	4 1/2	5 3/4	4 3/4	6 1/2	5 1/2	7 3/4	8 3/8	5 3/8	4 3/4	4 3/4	2 3/4
4	5	6 1/8	5 1/4	7	6	8 1/2	9 1/8	6 1/8	5 1/4	5 1/4	3
4 1/4	5 1/4	6 3/8	5 3/4	7 1/4	6 1/4	8 3/4	9 3/8	6 3/8	5 3/4	5 1/4	3
4 1/2	5 1/2	6 3/4	5 3/4	7 1/2	6 1/2	8 3/4	9 3/8	6 3/8	5 3/4	5 1/4	3
5	6	7 1/8	6 1/4	8	7	9 1/2	10 1/8	7 1/8	6 1/4	6 1/4	3 1/4
5 1/4	6 1/4	7 3/8	6 3/4	8 1/4	7 1/4	9 3/4	10 3/8	7 3/8	6 3/4	6 1/4	3 1/4
5 1/2	6 1/2	7 3/4	6 3/4	8 1/2	7 1/2	9 3/4	10 3/8	7 3/8	6 3/4	6 1/4	3 1/4
6	7	8 1/8	7 1/4	9	8	10 1/2	11 1/8	8 1/8	7 1/4	7 1/4	3 1/4
6 1/4	7 1/4	8 3/8	7 3/4	9 1/4	8 1/4	10 3/4	11 3/8	8 3/8	7 3/4	7 1/4	3 1/4
6 1/2	7 1/2	8 3/4	7 3/4	9 1/2	8 1/2	10 3/4	11 3/8	8 3/8	7 3/4	7 1/4	3 1/4
7	8	9 1/8	8 1/4	10	9	11 1/2	12 1/8	9 1/8	8 1/4	8 1/4	4 1/4
7 1/4	8 1/4	9 3/8	8 3/4	10 1/4	9 1/4	11 3/4	12 3/8	9 3/8	8 3/4	8 1/4	4 1/4
7 1/2	8 1/2	9 3/4	8 3/4	10 1/2	9 1/2	11 3/4	12 3/8	9 3/8	8 3/4	8 1/4	4 1/4
8	9	10 1/8	9 1/4	11	10	12 1/2	13 1/8	10 1/8	9 1/4	9 1/4	4 1/4
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9	10	11 1/8	10 1/4	12	11	13 1/2	14 1/8	11 1/8	10 1/4	10 1/4	4 1/4
9 1/4	10 1/4	11 3/8	10 3/4	12 1/4	11 1/4	13 3/4	14 3/8	11 3/8	10 3/4	10 1/4	4 1/4
9 1/2	10 1/2	11 3/4	10 3/4	12 1/2	11 1/2	13 3/4	14 3/8	11 3/8	10 3/4	10 1/4	4 1/4
10	11	12 1/8	11 1/4	13	12	14 1/2	15 1/8	12 1/8	11 1/4	11 1/4	4 1/4
10 1/4	11 1/4	12 3/8	11 3/4	13 1/4	12 1/4	14 3/4	15 3/8	12 3/8	11 3/4	11 1/4	4 1/4
10 1/2	11 1/2	12 3/4	11 3/4	13 1/2	12 1/2	14 3/4	15 3/8	12 3/8	11 3/4	11 1/4	4 1/4
11	12	13 1/8	12 1/4	14	13	15 1/2	16 1/8	13 1/8	12 1/4	12 1/4	4 1/4
11 1/4	12 1/4	13 3/8	12 3/4	14 1/4	13 1/4	15 3/4	16 3/8	13 3/8	12 3/4	12 1/4	4 1/4
11 1/2	12 1/2	13 3/4	12 3/4	14 1/2	13 1/2	15 3/4	16 3/8	13 3/8	12 3/4	12 1/4	4 1/4
12	13	14 1/8	13 1/4	15	14	16 1/2	17 1/8	14 1/8	13 1/4	13 1/4	4 1/4
12 1/4	13 1/4	14 3/8	13 3/4	15 1/4	14 1/4	16 3/4	17 3/8	14 3/8	13 3/4	13 1/4	4 1/4
12 1/2	13 1/2	14 3/4	13 3/4	15 1/2	14 1/2	16 3/4	17 3/8	14 3/8	13 3/4	13 1/4	4 1/4
13	14	15 1/8	14 1/4	16	15	17 1/2	18 1/8	15 1/8	14 1/4	14 1/4	4 1/4
13 1/4	14 1/4	15 3/8	14 3/4	16 1/4	15 1/4	17 3/4	18 3/8	15 3/8	14 3/4	14 1/4	4 1/4
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14	15	16 1/8	15 1/4	17	16	18 1/2	19 1/8	16 1/8	15 1/4	15 1/4	4 1/4
14 1/4	15 1/4	16 3/8	15 3/4	17 1/4	16 1/4	18 3/4	19 3/8	16 3/8	15 3/4	15 1/4	4 1/4
14 1/2	15 1/2	16 3/4	15 3/4	17 1/2	16 1/2	18 3/4	19 3/8	16 3/8	15 3/4	15 1/4	4 1/4
15	16	17 1/8	16 1/4	18	17	19 1/2	20 1/8	17 1/8	16 1/4	16 1/4	4 1/4

## EXTRA HEAVY CAST IRON SCREWED FITTINGS.

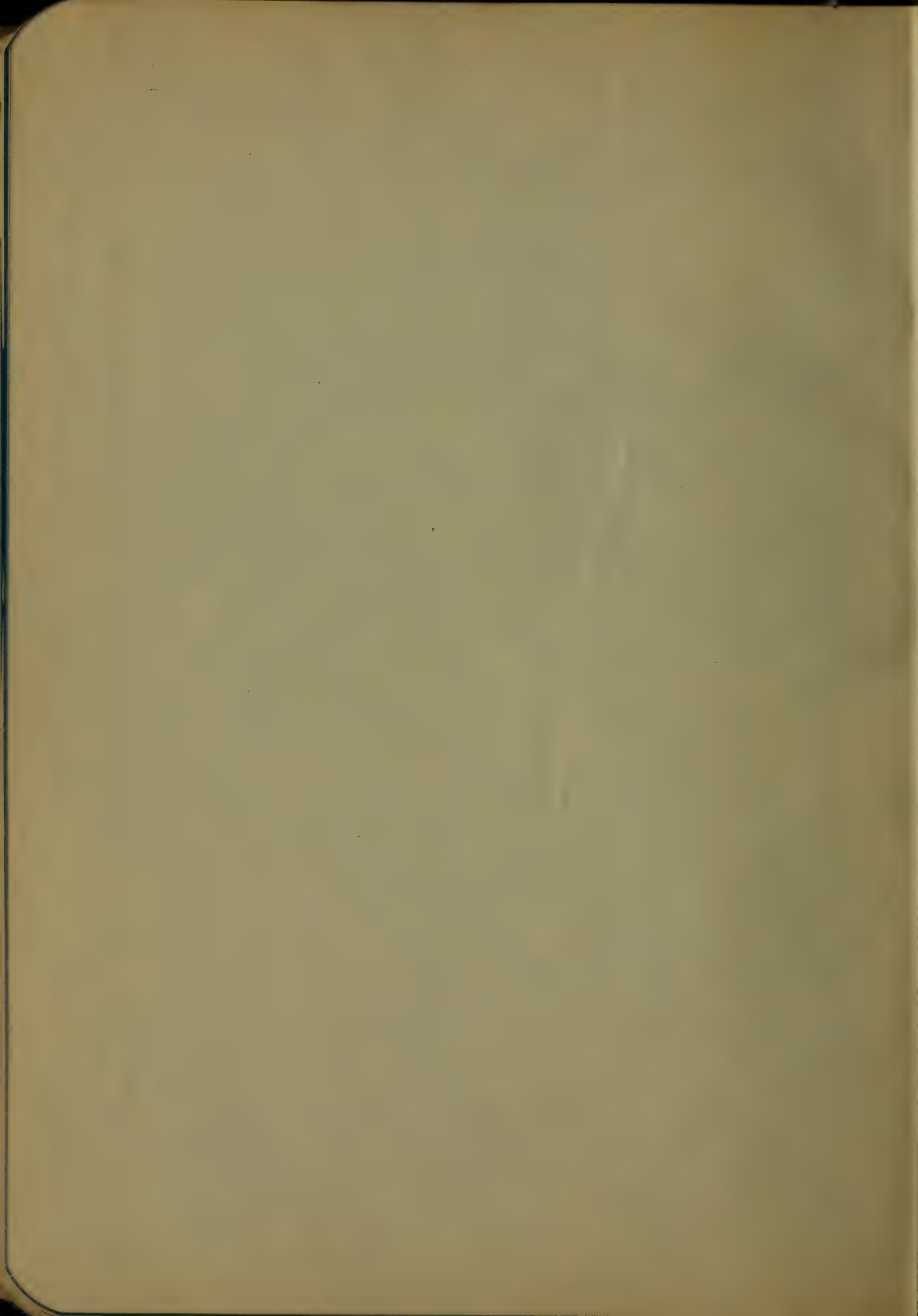
STEAM &amp;

WATER.



WORKING PRESSURE FROM 200 TO 800 LBS. PER SQ. INCH.

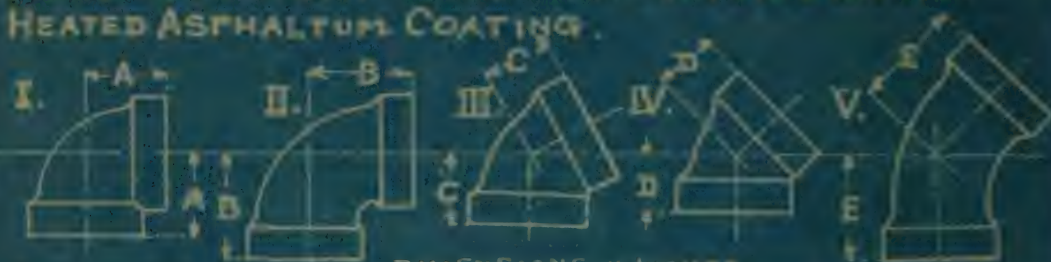






# CAST IRON DRAINAGE FITTINGS.

SCREWED FOR WROUGHT IRON PIPE WITH INSIDE PIPE BORE TO PREVENT CHOKING UP. WITH AND WITHOUT HEATED ASPHALTUM COATING.



DIMENSIONS IN INCHES.

PIPE SIZE, INCHES.	1 1/4	1 1/2	2	2 1/2	3	4	5	6	7	8	10
I. 90° ELBOWS. A	1 3/4	2 1/4	2 3/4	2 3/4	3 1/4	4 1/2	5 1/4	5 3/4	5 3/4	6 1/2	7 1/2
II. 90° LONG TURN ELB. B	2	2 1/2	3 1/4	3 3/4	4 1/2	5 3/4	6 1/4	7 1/4	8 1/4	9	10
III. 60° ELBOWS. C	1 1/2	1 3/4	2	2 1/2	2 3/4	3 3/4	3 3/4	4 1/4	4 1/2	5 1/4	6 1/4
IV. 45° ELBOWS. D	1 3/8	1 3/4	1 3/4	2 1/4	2 3/8	2 3/4	3 3/8	3 1/2	3 3/8	4 3/4	4 3/4
V. 45° LONG TURN ELB. E	2	2 1/4	2 1/2	2 3/4	2 3/4	3 1/2	4 1/4	5 1/4	6 1/2	7 1/4	9



PIPE SIZE, INCHES.	1 1/2	2	2 1/2	3	4	5	6	7	8	10
VI. 22 1/2° ELBOWS. F	1 1/4	1 3/4	2	2	2 1/4	2 3/4	2 3/4	3 1/4	3 3/4	4
VII. 11 1/4° ELBOWS. G	1 3/8	1 3/4	1 3/4	1 3/4	2 1/4	2 3/4	2 3/4	2 3/4	2 3/4	2 3/4
VIII. 5 1/2° ELBOWS. H		6 1/4	7 3/8	8 5/8	10 1/8	12 1/4	14 1/4			
IX. THREE-WAY ELB. I		3 1/2	3 3/4	4 5/8	5 3/4	6 1/8	7 1/8			
X. REDUCING TO " THREE-WAY ELB. K					3	4	4	6 and 5		
" " " L					9 1/2	11 3/8	12 3/8	14 1/4		
" " " M					4 1/4	5 1/4	5 3/4	7 1/8		



PIPE SIZE, INCHES.	2	2 1/4	4	4 x 5	5
XI. REDUCING BASIN TEE. M	-	-	-	-	-
II. FLANGED " " N	-	-	-	-	-
III. FLANGED " " O	-	-	-	-	-
IV. BASIN TEE. P	7	8 1/2	10	10	10

$$S = \frac{R}{2}$$





XV. B

XVI. 184

XVII.



90° LONGTURN Y BRANCHE. DOUBLE 90° LONGTURN Y BRANCHE.  
ALL DIMENSIONS IN INCHES.

TYPE	SIZE	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	7	8	10
XV	A	3 1/4	3 3/8	4 1/4	5 3/4	6 5/8	7 1/4	8 3/4	10 5/8	11 1/4	13 3/8	15 1/4	17 1/2
"	B	1 1/4	2 1/4	2 1/2	3 1/4	3 3/8	4 1/4	5 3/8	6 1/8	7 1/8	8 1/8	9	11
XVI	C	3 3/8	5 3/8	7 3/8	8	8 1/4	9 1/4	13 3/8	15 3/8	18 3/8	21 3/8	24 3/8	30 3/8
"	D	1 1/4	1 5/8	1 3/4	2	2 1/8	2 3/8	3 1/2	4 1/8	4 3/8	4 3/4	5 1/4	6 1/4
"	E	4 1/8	4 3/8	4 3/4	5 3/8	6 1/4	7 3/8	9 3/8	12 1/4	14 1/4	16 3/8	19 3/8	24 3/8
XVII	F	6 3/4	7 1/2	8 1/4	10 3/8	12 1/2	15	19 3/8	24 3/8	29 3/8	33 3/8	38 3/8	48 3/8
"	G	5 3/8	5 3/4	5 3/8	7 1/4	8 1/4	9 1/4	13 3/8	15 3/8	18 3/8	21 3/8	24 3/8	30 3/8

XVIII

XIX

XX



90° LONGTURN BRANCHE. DOUBLE 90° LONGTURN Y BRANCHE.

TYPE	SIZE	5x3	5x4	6x2	6x3	6x4	6x5	7x3	7x4	7x5	7x6	8x3	8x4
XVIII	H	5 1/4	6 1/4	7 1/4	8 1/4	9 1/4	10 1/4	11 1/4	12 1/4	13 1/4	14 1/4	15 1/4	16 1/4
"	I	2 1/2	2 3/4	3 1/4	3 3/4	4 1/4	4 3/4	5 1/4	5 3/4	6 1/4	6 3/4	7 1/4	7 3/4
"	J	2 3/8	2 5/8	3 1/8	3 3/8	4 1/8	4 3/8	5 1/8	5 3/8	6 1/8	6 3/8	7 1/8	7 3/8
XIX	K	5 3/8	6 3/8	7 3/8	8 3/8	9 3/8	10 3/8	11 3/8	12 3/8	13 3/8	14 3/8	15 3/8	16 3/8
"	L	3 3/8	4 3/8	5 3/8	6 3/8	7 3/8	8 3/8	9 3/8	10 3/8	11 3/8	12 3/8	13 3/8	14 3/8
"	M	1 1/4	1 5/8	1 3/4	1 7/8	2 1/8	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3 1/8	3 3/8
XX	N	5 3/8	6 3/8	7 3/8	8 3/8	9 3/8	10 3/8	11 3/8	12 3/8	13 3/8	14 3/8	15 3/8	16 3/8
"	O	2 1/4	2 1/2	2 3/4	3 1/4	3 3/4	4 1/4	4 3/4	5 1/4	5 3/4	6 1/4	6 3/4	7 1/4
XVIII	H	5 1/4	6 1/4	7 1/4	8 1/4	9 1/4	10 1/4	11 1/4	12 1/4	13 1/4	14 1/4	15 1/4	16 1/4
"	I	2 1/2	2 3/4	3 1/4	3 3/4	4 1/4	4 3/4	5 1/4	5 3/4	6 1/4	6 3/4	7 1/4	7 3/4
XIX	K	5 3/8	6 3/8	7 3/8	8 3/8	9 3/8	10 3/8	11 3/8	12 3/8	13 3/8	14 3/8	15 3/8	16 3/8
"	L	3 3/8	4 3/8	5 3/8	6 3/8	7 3/8	8 3/8	9 3/8	10 3/8	11 3/8	12 3/8	13 3/8	14 3/8
"	M	1 1/4	1 5/8	1 3/4	1 7/8	2 1/8	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3 1/8	3 3/8
XX	N	5 3/8	6 3/8	7 3/8	8 3/8	9 3/8	10 3/8	11 3/8	12 3/8	13 3/8	14 3/8	15 3/8	16 3/8
"	O	2 1/4	2 1/2	2 3/4	3 1/4	3 3/4	4 1/4	4 3/4	5 1/4	5 3/4	6 1/4	6 3/4	7 1/4





PIPE SIZE INCH	1½	2	2½	3	4	5	6	7	8	10
XXI	4½	5½	7½	7½	8½	10½	11½	13½	15½	17½
"	5	6½	8½	8½	10½	12½	14½	16½	18½	20½
"	2½	3½	4½	4½	5½	6½	7½	8½	9½	11½
XXII & XXIII	5½	6½	7½	9	10½	12½	14½	16½	18½	20½
"	8½	9½	10½	12½	14½	16½	18½	20½	22½	24½
"	3½	4½	5½	6½	7½	8½	9½	10½	11½	12½



PIPE SIZE INCHES		2x1½	2½x2	3x2½	3x2	3½x2½	4x2½	4x2	4x3	5x2	5x3	
XXIV	G	•	•	•	5½%	•	•	5½%	•	•	•	
	H	•	•	•	7%	•	•	8½%	•	•	•	
	I	•	•	•	3½%	•	•	3½%	•	•	•	
XXIV & XXV	J	5%	6%	7½%	7%	8	7½%	7½%	9½%	8½%	9½%	
	K	4½%	4½%	5%	5½%	5½%	6½%	6½%	7½%	7½%	7½%	
	L	4½%	4½%	4½%	4½%	5½%	5½%	6	6½%	6½%	7½%	
XXV	M	3½%	4½%	4½%	5½%	5½%	•	4½%	5½%	5½%	6	
"	N	4½%	6%	6½%	7%	7%	•	6½%	7½%	7½%	8½%	
	O	2½%	3½%	4½%	5	4½%	•	4½%	5	4½%	5½%	
XXVIII	P	4½	5½	6½	8	8	9	9	9	9	9	
PIPE SIZE		5x4	6x2	6x3	6x4	6x5	7x3	7x4	7x5	7x6	8x4	8x6
XXIV	G	9½%	6¼	8¼	9¼	10½%	•	•	•	•	•	•
	H	11½%	10%	11½%	12½%	13½%	•	•	•	•	•	•
	I	5½%	3½%	4½%	5½%	6¼	•	•	•	•	•	•
XXIV & XXV	J	11½%	8½%	10	11½%	13	10	11½%	12½%	16½%	11½%	14½%
	K	8½%	7½%	8½%	9½%	9½%	8½%	9½%	10½%	11½%	10½%	11½%
	L	8½%	8½%	8½%	9½%	10	9½%	10½%	10½%	11½%	11	12½%
XXVIII	O	9	9	9	9	9	9	9	9	9	9	9





## XXIX S. TRAPS.

## XXX HALF S. TRAPS.

## XXXI RUNNING TRAPS.



ALL DIMENSIONS IN INCHES.

PIPE SIZES, INCHES.	1	2	3	4	5	6	8	10
XXIX S. TRAPS.	A	3 1/4	10 1/4	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
B	6 1/4	8 1/4	10 1/4	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2
C	8	11 1/4	13 1/4	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2
XXX HALF S. TRAPS.	D	4	5 1/4	7	8 3/4	10 1/4	12 3/4	14 3/4
E	3 1/4	4 1/4	5 1/4	6 1/4	6 1/4	6 1/4	6 1/4	6 1/4
AND	F	2 1/4	3 1/4	4 1/4	4 1/4	4 1/4	4 1/4	4 1/4
XXXI RUNNING TRAPS	G	10 1/4	13 1/4	17 1/4	20 1/4	23 1/4	30 1/4	34 1/4

## XXXII. OFFSET.

## XXXIII. AIR INLET.

## XXXIV. SOLDERING NIPPLE.

## XXXV. ROOF CON'TION.



XXXII. OFFSETS.	D	H	K	D	H	K	D	H	K
REDUCING	2	7 1/4	4	4	9 1/4	4	5	15 1/2	12
XXXVI. OFFSETS:	2	9 1/4	6	4	11 1/4	6	6	13 1/4	6
HAVE SAME HEIGHT	2	11 1/4	8	4	13 1/4	8	6	15 1/4	8
AND OFFSET AS XXXII	2	13 1/4	10	4	15 1/4	10	6	17 1/4	10
FOR PIPE SIZES:	3	8 1/4	4	4	17 1/4	12	6	19 1/4	12
3x2, 4x2, 4x3, 5x2	3	10 1/4	6	5	18 1/4	6			
5x3, 5x4, 6x2, 6x3	3	12 1/4	8	5	14 1/4	8			
6x4 and 6x5.	3	14 1/4	10	5	16 1/4	10			

## XXXIII. CAPPING FOR PIPES 3, 4, 5, .. INCHES

## XXXIV. SOLDERING BRASS NIPPLE FOR PIPES 1 1/4, 1 1/2, 2, 3, 4

## XXXV. ROOF CONNECTIONS FOR PIPES 2, 3, 4, 5, 6, ..







MALLEABLE

## RETURN BENDS.

IRON.



CLOSE



MEDIUM.



OPEN PATTERN.

5 STYLES—RIGHT HAND.  
LEFT HAND.  
RIGHT & LEFT.  
D = WIDE  
PATTERN.

E = EXTRA  
HEAVY P.-H.

PIPE SIZE	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
A	•	1	1 1/4	•	1 3/4	•	1 3/4	2 1/2	•	•	•
B	•	1 1/4	1 3/4	•	2 1/4	•	2 3/4	3	•	•	•
C	•	1 1/2	2	•	2 3/4	•	3 1/4	4	•	4 1/2	5
D	1 1/2	2 1/4	4	6	6	•	6	5	7	•	7 1/2
E	•	•	•	•	1 3/4	2 1/4	•	3 1/4	3 3/4	•	•

## CAST IRON RETURN BENDS.



CLOSE.



WIDE PATT.

OPEN PATTERN  
WITH  
BACK OUTLET

RIGHT.



OPEN PATT.

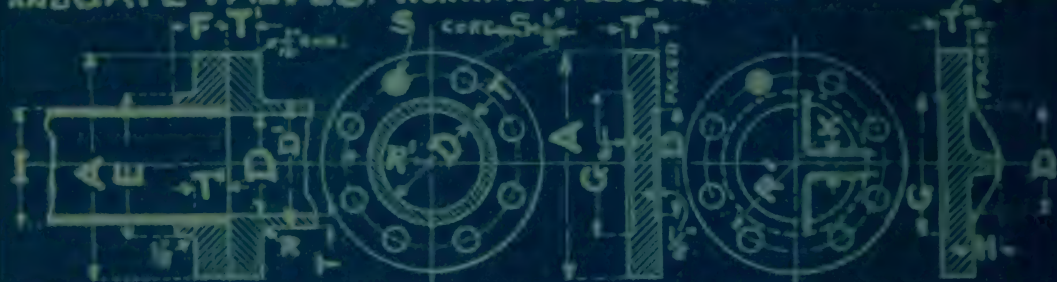
I = EXTRA WIDE PATTERN.

PIPE SIZE	F	G	H	K	I
1/2	1 1/4	•	•	•	•
3/4	1 1/2	•	1 3/8	1 3/8	•
1	1 3/4	•	1 3/4	2 3/8	2 3/8
1 1/4	•	3	•	•	4 1/2
1 1/2	•	4	•	•	•
1 3/4	•	5	•	•	•
2	•	6	•	•	•
2 1/4	2 1/4	8	2 1/4	3	•
2 1/2	•	4	•	•	•
2 3/4	•	6	•	•	•
3	•	8	•	•	•
3 1/4	2 3/4	4 3/8	2 1/2	3 1/2	2 5/8
3 1/2	•	6	•	•	•
3 3/4	•	8	•	•	•
4	3 1/4	4 3/8	3 1/4	4 1/2	2 7/8
4 1/4	•	6	•	•	•
4 1/2	•	7	•	•	•
4 3/4	•	8	•	•	•
5	3 3/4	•	3 3/4	5 1/2	4 1/2
5 1/4	4 1/4	•	4 1/4	6 1/2	6 1/2
5 1/2	•	7 1/2	•	•	•
5 3/4	•	11	•	•	•





# DIMENSIONS OF STANDARD CAST IRON PIPES, FLANGES, BOLTS AND TEMPLATES FOR DRILLING, FOR STANDARD FLANGED FITTINGS & FLANGED GLOBE, ANGLE AND GATE VALVES. WORKING PRESSURE 75, 150 & 200 LBS./SQ. INCH.



SIZE OF PIPE D INCHES	THICKNESS OF PIPE T PRESSURE LBS./SQ. IN.			DIAM. OF FLANGE A INCH.	THICKNESS OF FLANGE T PRESSURE LBS./SQ. IN.			RADIUS OF BOLT CIRCLE R INCH.	NUMBER OF BOLTS	SIZE OF BOLTS S		SCREW FLANGES			BLANK FLANGES				
	75	150	200		75	150	200			150 LBS.	200 LBS.	DIAM. OF HUB INCH.	THICKNESS OF HUB INCH.	OUTSIDE DIAM. M.T. PIPE INCH.	DIAM. OF RECESS INCH.	NUM. OF RIBS	DEPTH OF RIB INCH.	THICKNESS OF WEB INCH.	PRESSURE PER 36 INCH FLANGE
1/2				4				5/8	4	1/2	5/8	1 1/2	3/8	3 1/2	1 1/4				200
3/4				4 1/4				5/8	4	1/2	5/8	1 3/4	3/8	4	1 1/4				200
1				4 1/2				5/8	4	1/2	5/8	2	1	4 1/2	1 3/4				200
1 1/4				5				5/8	4	1/2	5/8	2 1/4	1	5 1/4	2 1/4				200
1 1/2				5 1/2				5/8	4	1/2	5/8	2 3/4	1	5 3/4	2 3/4				200
2				6				5/8	4	1/2	5/8	3	1	6 1/4	3				200
2 1/2				7				5/8	4	1/2	5/8	3 1/4	1 1/8	6 3/4	3 1/4				200
3				7 1/2				5/8	4	1/2	5/8	4	1 1/4	7 1/4	4 1/4				200
3 1/2				8 1/2				5/8	4	1/2	5/8	4 1/4	1 1/2	7 3/4	5 1/4				200
4				9				5/8	4	1/2	5/8	5	1 3/8	8 1/4	5 3/4				200
4 1/2				9 1/4				5/8	4	1/2	5/8	5 1/4	1 3/8	8 3/4	5 3/4				200
5				10				5/8	4	1/2	5/8	6	1 1/2	9 1/4	6 1/4	4	1 1/4	5/8	150
6	1/2			11	3/8			5/8	4	1/2	5/8	7	1 1/2	10 1/4	7 1/4	4	1 1/2	5/8	150
7	1/2	5/8		12 1/4	1			5/8	4	1/2	5/8	8	1 3/4	11 1/4	8 3/4	4	1 3/4	5/8	130
8	1/2	5/8		13 1/4	1 1/8			5/8	4	1/2	5/8	9	1 3/4	12 1/4	9 1/4	4	2	5/8	115
9	3/4	5/8		16	1 1/2			5/8	4	1/2	5/8	11 1/2	1 3/4	14 1/4	11 1/4	4	2 1/4	5/8	90
10	3/4	5/8		16 1/4	1 1/2			5/8	4	1/2	5/8	12	2	15 1/4	12	4	2 1/4	5/8	85
12	5/8	5/8		19	1 3/8			5/8	4	1/2	5/8	14 1/2	2	17 1/4	14 1/2	6	2 1/2	5/8	65
14	5/8	5/8		21	1 3/8			5/8	4	1/2	5/8	16 1/2	2	19 1/4	16 1/2				65
15	5/8	5/8		22 1/2	1 3/8			5/8	4	1/2	5/8	17 1/2	2	20 1/4	17 1/2				65
16	5/8	5/8		23 1/2	1 3/8			5/8	4	1/2	5/8	18 1/2	2 1/4	21 1/4	18 1/2				52
18	3/4	5/8		25	1 3/8	1 1/2		5/8	4	1/2	5/8			22	20				51
20	3/4	5/8		27 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8				22 1/2				50
22	3/4	5/8		29 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8				24				48
24	3/4	5/8		32	1 3/8	1 1/2		5/8	4	1/2	5/8								44
26	3/4	5/8		34 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8								43
28	1	5/8		36 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8								40
30	1	5/8		38 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8								37
36	1 1/8	5/8		45 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8								33
42	1 1/8	5/8		52 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8								31
48	1 1/8	5/8		59 1/2	1 3/8	1 1/2		5/8	4	1/2	5/8								26

# DIMENSIONS OF HIGH PRESSURE & EXTRA HIGH PRESSURE CAST IRON PIPE FLANGES AND TEMPLATES FOR DRILLING, MEDIUM & HEAVY HYDRAULIC FITTINGS AND VALVES WORKING PRESSURE 250 AND 800 LBS/SQ. INCH.



SIZE OF PIPE D	THICKNESS OF PIPE T		FLANGE				SCREW FLANGES				PRESSURE	
	250	800	DIAMETER A	THICKNESS T	DIAMETER T	THICKNESS T	DIAM. OF HUB E	THICKNESS AT HUBS F	INSIDE DIAM. OF GROOVES L	FIBRE STRAIN W.I. PIPES	6000	6000
	250	800	250	800	250	800	250	800	250	800	1000	1000
1 1/4	1/2	5/8	5	3/4	6 1/2	1 1/4	1 1/4	2 1/4	3	2 1/4	3	
1 1/2	5/8	3/4	6	3/4	7 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
2	3/4	7/8	7 1/2	3/4	8 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
2 1/2	7/8	1	8 1/2	3/4	9 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
3	1	1 1/8	9 1/2	3/4	10 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
3 1/2	1 1/8	1 1/4	10 1/2	3/4	11 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
4	1 1/4	1 1/2	11 1/2	3/4	12 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
4 1/2	1 1/2	1 3/4	12 1/2	3/4	13 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
5	1 3/4	2	13 1/2	3/4	14 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
5 1/2	2	2 1/8	14 1/2	3/4	15 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
6	2 1/8	2 1/4	15 1/2	3/4	16 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
6 1/2	2 1/4	2 3/8	16 1/2	3/4	17 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
7	2 3/8	2 1/2	17 1/2	3/4	18 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
7 1/2	2 1/2	2 3/4	18 1/2	3/4	19 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
8	2 3/4	3	19 1/2	3/4	20 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
8 1/2	3	3 1/8	20 1/2	3/4	21 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
9	3 1/8	3 1/4	21 1/2	3/4	22 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
9 1/2	3 1/4	3 3/8	22 1/2	3/4	23 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
10	3 3/8	3 1/2	23 1/2	3/4	24 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
10 1/2	3 1/2	3 3/4	24 1/2	3/4	25 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
11	3 3/4	4	25 1/2	3/4	26 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
11 1/2	4	4 1/8	26 1/2	3/4	27 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
12	4 1/8	4 1/4	27 1/2	3/4	28 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
12 1/2	4 1/4	4 3/8	28 1/2	3/4	29 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
13	4 3/8	4 1/2	29 1/2	3/4	30 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
13 1/2	4 1/2	4 3/4	30 1/2	3/4	31 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
14	4 3/4	5	31 1/2	3/4	32 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
14 1/2	5	5 1/8	32 1/2	3/4	33 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
15	5 1/8	5 1/4	33 1/2	3/4	34 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
15 1/2	5 1/4	5 3/8	34 1/2	3/4	35 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
16	5 3/8	5 1/2	35 1/2	3/4	36 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
16 1/2	5 1/2	5 3/4	36 1/2	3/4	37 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
17	5 3/4	6	37 1/2	3/4	38 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
17 1/2	6	6 1/8	38 1/2	3/4	39 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
18	6 1/8	6 1/4	39 1/2	3/4	40 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
18 1/2	6 1/4	6 3/8	40 1/2	3/4	41 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
19	6 3/8	6 1/2	41 1/2	3/4	42 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
19 1/2	6 1/2	6 3/4	42 1/2	3/4	43 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
20	6 3/4	7	43 1/2	3/4	44 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
20 1/2	7	7 1/8	44 1/2	3/4	45 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
21	7 1/8	7 1/4	45 1/2	3/4	46 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
21 1/2	7 1/4	7 3/8	46 1/2	3/4	47 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
22	7 3/8	7 1/2	47 1/2	3/4	48 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
22 1/2	7 1/2	7 3/4	48 1/2	3/4	49 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
23	7 3/4	8	49 1/2	3/4	50 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
23 1/2	8	8 1/8	50 1/2	3/4	51 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	
24	8 1/8	8 1/4	51 1/2	3/4	52 1/2	1 1/4	1 1/4	2 1/4	3 1/4	2 1/4	3	

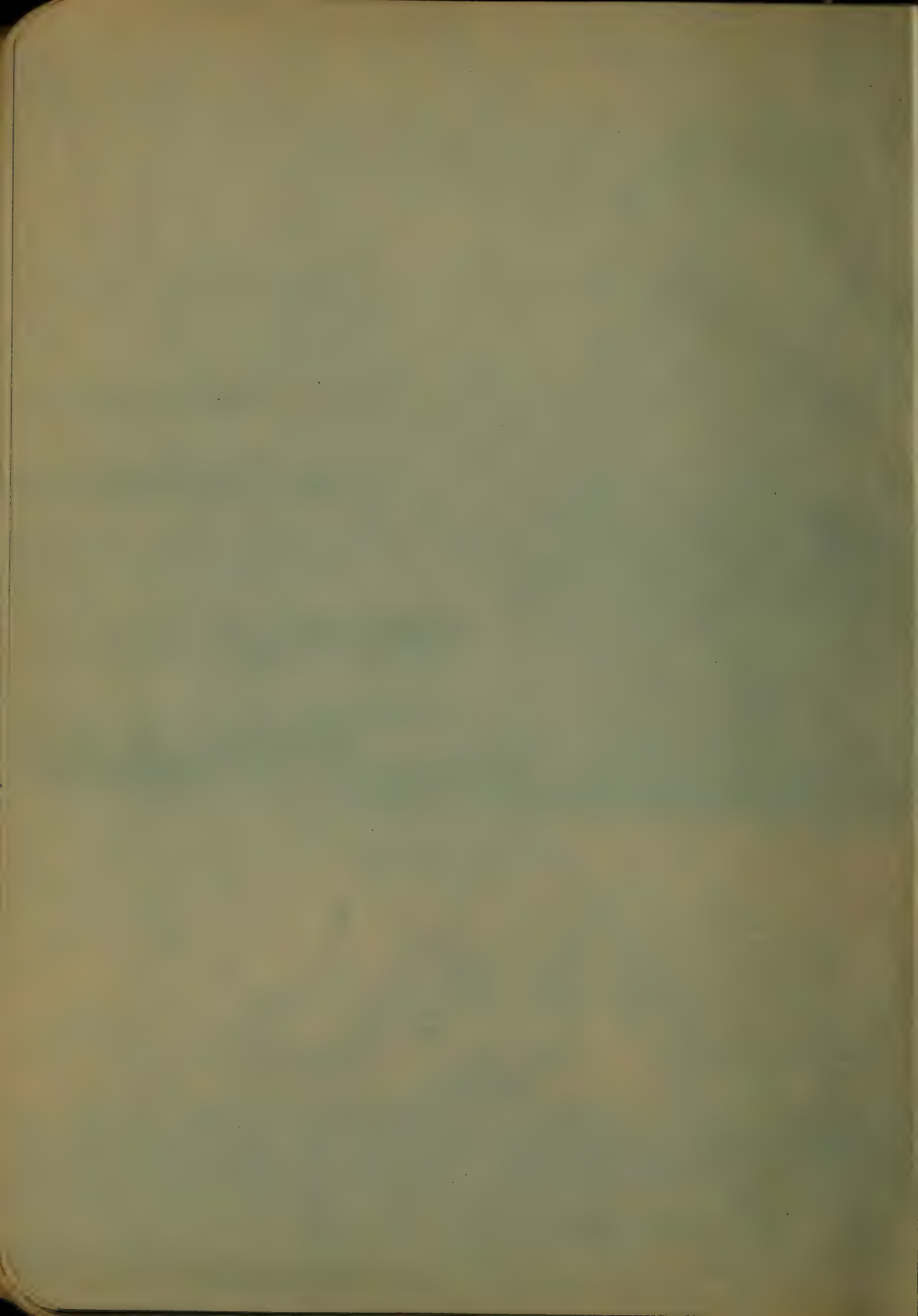
FOR W.I. PIPES SEE PAGE N° 177.

BLANK FLANGES

SIZE OF PIPE: 2" 2 1/2" 3" 3 1/2" 4" 4 1/2" 5" 6" 7" 8"

G = 3 1/4" 4" 4 1/2" 5 1/2" 6" 6 1/2" 7" 8 1/2" 9 1/2" 10"







# ST. DIMENSIONS OF STANDARD AND EXTRA HEAVY FLANGED FITTINGS.



E = DIAM. OF BOLT CIRCLE, D = DIAM. OF BOLTS.

N = NUMBER OF BOLTS.

L = LENGTH OF BOLTS.

WORKING PRESSURE: STANDARD FITTINGS 150 LBS./SQ. INCH. EXTRA HEAVY FITTINGS 250 LBS./SQ. INCH.

PIPE  
SIZES  
IN  
INCHES

FITTINGS RANGES		STANDARD		150/250		STANDARD		EXTRA HEAVY	
A	T	B	C	F	T	E	D	N	L
ST. H.	ST. H.	EXTRA HEAVY	ST. H.	150 LBS./SQ. INCH	250 LBS./SQ. INCH	250 LBS./SQ. INCH	250 LBS./SQ. INCH	250 LBS./SQ. INCH	250 LBS./SQ. INCH
1/2	4	1/2			1/2	2 3/4	1 1/2	4	
3/4	4 1/4	1/2			3/4	3	1 1/2	4	
1	4 1/2	1/2			3/4	3 1/4	1 1/2	4	
1 1/4	5	5/8			3/4	3 3/4	1 1/2	4	3 3/4
1 1/2	5 1/2	5/8			3/4	4 1/4	1 1/2	4	4 1/2
2	6	3/4	7/8	4 1/2	1/2	4 3/4	5/8	4	2 3/4
2 1/2	7	3/4	1	5	1/2	5 1/2	5/8	4	3 1/4
3	7 1/2	3/4	1 1/8	5 1/2	3/4	6	5/8	4	3 1/2
3 1/2	8 1/4	3/4	1 1/4	6	1/2	7	3/4	4	3 3/4
4	9	3/4	1 1/2	6 1/2	1/2	7 1/2	3/4	4	4
4 1/2	9 1/2	3/4	1 3/4	7	1/2	8 1/2	3/4	4	4 1/4
5	10	3/4	1 3/4	7 1/2	3/4	9 1/2	3/4	4	4 1/2
5 1/2	10 1/2	3/4	1 3/4	8	3/4	10 1/2	3/4	4	4 3/4
6	11	3/4	1 3/4	8 1/2	3/4	11 1/2	3/4	4	4 1/2
7	12 1/2	3/4	1 3/4	9 1/2	3/4	12 1/2	3/4	4	4 1/2
8	13 1/2	3/4	1 3/4	10 1/2	3/4	13 1/2	3/4	4	4 1/2
9	15	3/4	1 3/4	11 1/2	3/4	14 1/2	3/4	4	4 1/2
10	16	3/4	1 3/4	12 1/2	3/4	15 1/2	3/4	4	4 1/2
12	19	3/4	1 3/4	14 1/2	3/4	17 1/2	3/4	4	4 1/2
14	21	3/4	1 3/4	16 1/2	3/4	19 1/2	3/4	4	4 1/2
16	23 1/2	3/4	1 3/4	18 1/2	3/4	21 1/2	3/4	4	4 1/2
18	25	3/4	1 3/4	20 1/2	3/4	23 1/2	3/4	4	4 1/2
20	27 1/2	3/4	1 3/4	22 1/2	3/4	25 1/2	3/4	4	4 1/2
22	29 1/2	3/4	1 3/4	24 1/2	3/4	27 1/2	3/4	4	4 1/2
24	32	3/4	1 3/4	26 1/2	3/4	29 1/2	3/4	4	4 1/2
26	34	3/4	1 3/4	28 1/2	3/4	31 1/2	3/4	4	4 1/2
28	36 1/2	3/4	1 3/4	30 1/2	3/4	33 1/2	3/4	4	4 1/2
30	38 1/2	3/4	1 3/4	32 1/2	3/4	35 1/2	3/4	4	4 1/2
36	45 1/2	3/4	1 3/4	39 1/2	3/4	42 1/2	3/4	4	4 1/2
42	52 1/2	3/4	1 3/4	46 1/2	3/4	49 1/2	3/4	4	4 1/2
48	59 1/2	3/4	1 3/4	53 1/2	3/4	56 1/2	3/4	4	4 1/2







# ELECTRICAL UNITS AND FORMULAS.

**CIRCULAR MIL** IS THE AREA OF CROSS SECTION OF A WIRE ONE THOUSANDTH OF AN INCH OR ONE MIL IN DIAMETER.

**CANDLE POWER** IS THE UNIT OF LIGHT PRODUCED BY A CANDLE BURNING TWO GRAINS OF SPERMACEIN PER MINUTE.

**OHM** IS THE UNIT OF ELECTRICAL RESISTANCE DUE TO 1000 FEET OF N°10 B.&S.G. PURE COPPER WIRE AT A TEMPERATURE OF 75°F. SEE PAGE 192.

**AMPERE** IS THE UNIT OF VOLUME OR STRENGTH OF AN ELECTRIC CURRENT, WHICH WILL DECOMPOSE ONE OUNCE OF WATER, WHEN PASSED THROUGH IT FOR 84 HOURS, OR WHICH IS EQUAL TO THE CURRENT GENERATED BY A BATTERY CONSUMING ZINC AT A STEADY RATE OF ONE OUNCE PER 24 HOURS.

**VOLT** IS THE UNIT OF PRESSURE, VOLTAGE OR ELECTRIC MOTIVE FORCE OF A SINGLE FREELY CHARGED LEAD STORAGE BATTERY CELL OR EQUAL TO TWO-THIRDS OF THE PRESSURE REQUIRED FOR DECOMPOSING WATER.

**WATT** IS THE UNIT OF POWER, EQUAL TO  $\frac{1}{746}$  OF A HORSE POWER.

**KILOWATT** EQUAL THOUSAND WATTS OR 1,341.

**OHM'S LAW:**  $\text{CURRENT} = \frac{\text{ELECTROMOTIVE FORCE IN VOLTS}}{\text{RESISTANCE IN OHMS.}}$

$\frac{\text{DISTANCE IN FEET} \times \text{AMPERES} \times 21}{\text{VOLTS LOST}} = \text{CIRC. MILS. SEE PAGE 192}$   
FOR SIZE OF WIRE.

FOR AMPERES SEE PAGE 196. FOR VOLTS LOST SEE PAGE 195

$\text{DISTANCE IN FEET} \times \text{AMPERES} \times 21 = \text{VOLTS LOST}$   
CIRCULAR MILS.

$\frac{\text{VOLTS LOST}}{\text{AMPERES}} = \text{RESISTANCE IN OHMS.}$

$\text{VOLTS LOST} = \text{AMPERES} \times \text{OHMS.}$

$\text{POWER IN WATTS} = \text{AMPERES} \times \text{VOLTS OR}$   
 $= \text{AMPERES} \times \text{AMPERES} \times \text{OHMS.}$

$\text{HORSE POWER} = \frac{\text{NUMBER OF WATTS}}{746.}$  SEE  
PAGE 198.





# RESISTANCES OF PURE COPPER

BROWN & SHARPE GAUGE.  
75 DEGREE FAH.

NUMBER OF GAUGE.	DIAMETER MILS. D.	CIRCULAR MILS. D. <sup>2</sup> (MIL. = .001 IN.)	POUNDS PER 1000 FEET	POUNDS PER MILE.	FEET PER POUND.	OHMS PER 1000 FEET.	OHMS PER MILE	OHMS PER POUND
0000	460.000	211600.00	639.33	3375.7	1.56	.04906	.25903	.00007674
000	409.640	167805.00	507.01	2677.0	1.97	.06186	.32664	.00012039
00	364.800	133079.40	402.09	2123.0	2.49	.07801	.41187	.00019423
0	324.860	105538.00	318.86	1683.6	3.14	.09838	.51937	.0003850
1	289.300	83694.20	252.88	1335.2	3.95	.12404	.65490	.00048994
2	257.630	66373.00	200.54	1058.8	4.99	.15640	.82582	.00078043
3	229.420	52634.00	159.03	839.68	6.29	.19723	1.0414	.0012406
4	204.310	41742.00	126.12	665.91	7.93	.24869	1.3131	.0019721
5	181.940	33102.00	100.01	528.05	10.00	.31361	1.6553	.0031361
6	162.020	26250.50	79.32	418.81	12.61	.39546	2.0881	.0049868
7	144.280	20816.00	62.90	332.11	15.90	.49871	2.6331	.0079294
8	128.490	16509.00	49.88	263.37	20.05	.62881	3.3201	.012608
9	114.430	13094.00	39.56	208.88	25.28	.79281	4.1860	.020042
10	101.890	10381.00	31.37	165.63	31.38	1.00000	5.2800	.031380
11	90.742	8234.00	24.88	137.37	40.20	1.2607	6.6568	.050682
12	80.808	6529.90	19.73	104.18	50.69	1.5898	8.3940	.080685
13	71.961	5178.40	15.65	82.632	63.91	2.0047	10.585	.12841
14	64.048	4106.70	12.44	65.674	80.38	2.5278	13.347	.20322
15	57.068	3256.70	9.84	51.956	101.63	3.1150	16.477	.31658
16	50.820	2582.90	7.81	41.237	128.14	4.0191	21.221	.51601
17	45.257	2048.20	6.19	32.693	161.59	5.0683	26.761	.81900
18	40.303	1624.30	4.91	25.925	203.76	6.3911	33.745	1.3023
19	35.876	1287.10	3.88	20.507	257.47	8.0654	42.585	2.0759
20	31.961	1021.50	3.09	16.315	324.00	10.163	53.657	3.2926
21	28.462	810.10	2.45	12.936	408.56	12.815	67.660	5.2355
22	25.347	642.70	1.94	10.243	515.15	16.152	85.283	8.3208
23	22.571	509.45	1.54	8.1312	649.66	20.377	107.59	13.238
24	20.100	404.01	1.22	6.4416	819.21	25.695	135.67	21.050
25	17.900	320.40	.97	5.1216	1032.96	32.400	171.07	33.466
26	15.940	254.01	.77	4.0656	1302.61	40.868	215.79	35.235
27	14.195	201.50	.61	3.2208	1642.58	51.519	272.02	84.644
28	12.641	159.79	.48	2.5344	2071.22	64.966	343.02	134.56
29	11.257	126.72	.38	2.0064	2611.82	81.921	432.54	213.96
30	10.025	100.5	.30	1.6840	3293.97	103.30	545.39	340.25
31	8.928	79.71	.24	1.2672	4152.22	127.27	671.99	528.45
32	7.950	63.20	.19	1.0032	5236.66	164.26	867.27	860.33
33	7.080	50.13	.15	.7920	6602.71	207.08	1093.4	1367.3
34	6.304	39.74	.12	.6336	8328.30	261.23	1379.3	2175.5
35	5.614	31.52	.10	.5280	10501.35	329.35	1738.9	3458.5
36	5.000	25.00	.08	.4224	13238.83	415.24	2192.5	5497.4
37	4.453	19.83	.06	.3168	16691.06	523.76	2765.5	8742.1
38	3.965	15.72	.05	.2640	20854.65	640.37	3436.7	13772.0
39	3.531	12.47	.04	.2112	26302.22	832.48	4395.5	21896.0
40	3.144	9.89	.03	.1584	33175.94	1049.7	5342.1	34823.0



## WIRE.

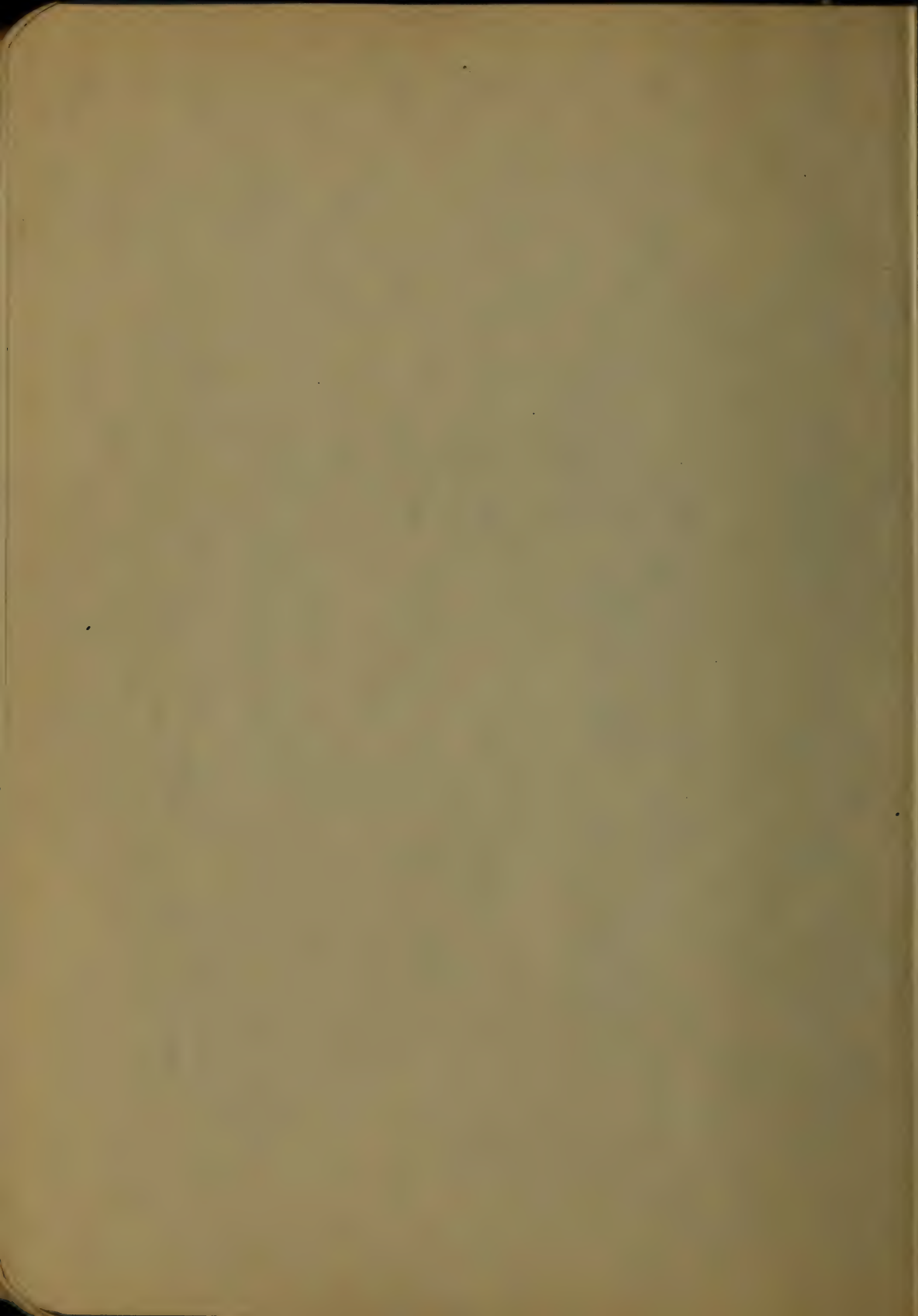
ONE MIL. = .001 INCH.

RESISTANCES OF  
GERMAN SILVER WIRE.

AMERICAN OR BROWN &amp; SHARPEG.

COPPER 2, ZINC 6.3, NICKEL 7.9, IRON 6.5;

FEET PER OHM.	SAFE AMPERES		18% ALLOY.		30% ALLOY.		NUMBER OF GAUGE.
	CON- CEALED	OPEN WORK	OHMS PER 1000 FEET	OHMS PER POUND	OHMS PER 1000 FEET	OHMS PER POUND	
20383.	218	312	.	.	.	.	0000
16165.	181	262	.	.	.	.	000
12820.	150	220	.	.	.	.	00
10166	125	185	.	.	.	.	0
8062.3	105	156	.	.	.	.	1
63937	88	131	.	.	.	.	2
50742	75	110	.	.	.	.	3
4021.0	63	92	.	.	.	.	4
3186.7	53	77	.	.	.	.	5
2522.7	45	65	7.20	.	11.21	.	6
2005.2	39	55	9.12	.	14.18	.	7
1590.3	33	46	11.772	.73598	17.658	.35397	8
1261.3	28	39	11.832	.37494	17.748	.56241	9
1000.0	25	32	18.72	.59652	28.08	.89478	10
793.18	20	27	23.598	.94842	35.397	1.42263	11
629.02	17	23	29.754	1.50786	44.631	2.26179	12
498.83	15	19	37.512	2.39778	56.268	3.59667	13
395.60	12	16	47.304	3.8124	70.956	5.7186	14
321.02	9	12	59.652	6.0624	89.478	9.0956	15
248.81	6	8	75.222	9.639	112.833	14.458	16
197.30	4½	6½	94.842	15.327	142.263	22.990	17
156.47	3	5	119.61	24.3702	179.41	36.5553	18
123.99			155.106	40.9896	232.659	61.4344	19
98.401			190.188	61.614	285.282	92.421	20
78.067			239.814	97.974	359.721	146.961	21
61.911			302.382	155.772	463.573	233.658	22
49.087			381.33	247.734	571.99	371.601	23
38.913			480.334	393.93	721.251	590.89	24
30.864			606.312	626.31	909.468	939.46	25
24.469			764.526	995.958	1146.879	1493.937	26
19.410			964.134	1535.622	1446.201	2375.433	27
15.393			1215.756	2518.075	1823.634	3777.112	28
12.207			1533.06	4004.082	2299.59	6006.123	29
9.6812			1933.038	6368.356	2899.537	9552.534	30
7.8573			2437.236	10119.978	3655.854	15179.967	31
6.0880			3073.77	16096.356	4610.65	24144.534	32
4.8290			3875.616	25589.628	5813.424	38384.442	33
3.8281			4888.494	40712.76	7332.741	61069.14	34
3.0363			6163.974	64729.87	9245.961	97094.30	35
2.4082			7770.316	102876.482	11656.224	154314.723	36
1.9093			9797.166	163524.78	14696.749	245287.17	37
1.5143			12357.198	257764.68	18535.797	336647.02	38
1.2012			15570.828	409546.8	23356.242	614320.2	39
.9527			19653.57	652024.62	29480.35	978036.93	40





# COMPARATIVE RESISTANCE OF VARIOUS METALS.

	RATIO.		RATIO.
COPPER...	1.0	IRON BBB...	5.5
SILVER...	1.02	" BB.....	6.4
ALUMINUM...	1.8	" B.....	7.4
PHOSPHORE BRONZE...	3.0	STEEL.....	7.5
PLATINUM.....	5.5	GERMAN SILVER...	18 $\frac{1}{2}$ ... 18.7
			30 $\frac{1}{2}$ ... 28.1

TO FIND THE RESISTANCE OF A CERTAIN WIRE OF GIVEN LENGTH, MULTIPLY THE RESISTANCE OF COPPER WIRE OF THE SAME LENGTH WITH THE RATIO OF THAT CERTAIN WIRE.

FOR RESISTANCES OF COPPER WIRE SEE PAGE 201.

## EQUIVALENTS OF WIRES. B & S. GAUGE.

INSTEAD OF USING A SINGLE WIRE OF THE AREA NEEDED, USE ANY COMBINATION, WHICH TOGETHER HAVE THE SAME AREA IN CIR. MILS. FOR ALTERNATING CURRENTS DO NOT USE ANY SINGLE WIRE LARGER THAN N° 8. BUT USE THE SMALLER WIRES EQUIVALENT TO IT. SEE TABLE, SINGLE WIRE MAKE COMPLICATION AND ADDITIONAL RESISTANCES.

GAUGE OF WIRE.	EQUIVALENT WIRES.			GAUGE OF WIRE.	EQUIVALENT WIRES.		
	N° G.	N° G.	G. G.		N° G.	N° G.	G. G.
0000	2-0	4-3	1 . . .	8	2-11	4-14	10 AND 12
000	2-1	4-4	1 . . .	9	2-12	4-15	12 " 13
00	2-2	4-5	1 AND 3	10	2-13	4-16	12 " 14
0	2-3	4-6	2 " 4	11	2-14	4-17	13 " 15
1	2-4	4-7	3 " 5	12	2-15	4-18	14 " 16
2	2-5	4-8	4 " 6	13	2-16	"	15 " 17
3	2-6	4-9	5 " 7	14	2-17	"	16 " 18
4	2-7	4-10	6 " 8	15	2-18	"	"
5	2-8	4-11	7 " 9				
6	2-9	4-12	8 " 10				
7	2-10	4-13	9 " 11				

N° = NUMBER OF WIRES. G = GAUGE NUMBER.





## VOLTS LOST

## AT DIFFERENT PERCENT DROP.

THE LOSS IN VOLTS DUE TO THE RESISTANCE OF A WIRE IS USUALLY FIGURED AS A CERTAIN PERCENTAGE OF THE VOLTAGE AT THE GENERATOR OR OTHER STARTING POINT. WHEN THIS PERCENTAGE AND THE VOLTAGE AT THE DISTRIBUTING POINTS ARE GIVEN THE ACTUAL DROP IN VOLTS IS AS GIVEN IN TABLE:

PER CENT DROP	VOLT CIRCUIT									
	VOLT AT LAMPS OR AT DISTRIBUTION POINTS									
	52	100	110	220	500	1000	2000	3000	3500	5000
1/2	.261	.502	.552	1.1	2.51	5.02	10.05	15.07	17.68	25.12
1	.525	1.01	1.11	2.22	5.05	10.1	20.2	30.3	35.36	50.5
1 1/2	.782	1.52	1.67	3.35	7.61	15.2	30.4	45.68	53.5	76.1
2	1.06	2.04	2.24	4.48	10.2	20.4	40.8	61.2	71.4	102.4
2 1/2	1.33	2.56	2.82	5.64	12.8	25.6	51.2	76.8	89.76	128.2
3	1.61	3.09	3.4	6.8	15.4	30.9	61.8	92.8	108.2	154.6
4	2.16	4.10	4.58	9.16	20.8	41.6	83.3	125	145.8	208.3
5	2.73	5.26	5.78	11.57	26.3	52.6	105.0	163.2	184.2	263.1
6	3.31	6.38	7.02	14.04	31.9	63.8	127.0	191.8	223.4	319.1
7	3.91	7.52	8.27	16.55	37.6	75.2	150.0	225.8	263.4	376.3
8	4.52	8.69	9.56	19.13	43.4	86.9	173.0	260.8	304.3	434.7
9	5.14	9.89	10.87	21.75	49.4	98.9	197.0	296.7	346.1	494.5
10	5.77	11.11	12.22	24.44	55.5	111.0	222.0	333.3	388.8	555.0
11	6.42	12.35	13.59	27.19	61.7	123.0	247.0	370.8	432.3	617.9
12	7.09	13.63	14.99	29.99	68.1	136.0	272.0	409.1	477.2	681.8
13	7.76	14.94	16.43	32.87	74.7	149.0	298.0	450.7	523	747.0
14	8.46	16.27	17.9	35.81	81.3	162.0	325.0	495.3	569.8	813.0
15	9.17	17.64	19.41	38.82	88.2	176.0	352.0	522.4	612.6	882.0
20	13.0	25.0	27.5	55.0	125.0	250.0	400.0	750	875	1250
25	17.33	33.33	36.66	73.33	166.0	333.0	666.0	1000	1166	1666

**VOLTS LOST = AMPERES X OHMS.**

THUS TO DELIVER 220 VOLTS AT THE LAMP WITH A DROP OF 5% ON THE LINE REQUIRES  $220 + 11.57 = 231.57$  VOLTS AT THE STARTING POINT.







## AMPERES PER LAMP.

BASED AT 3% WATTS PER CANDLE POWER AVAILABLE  
AVERAGE.

CANDLE POWER LAMP	VOLTAGE OF CIRCUIT.										
	WATTS	AMPERES PER LAMP									
		52	100	110	220	500	1000	2000	3000	3500	5000
10	34.37	.46	.343	.312	.156	.069	.034	.017	.009	.003	+
16	53	1.057	.55	.5	.250	.111	.055	.028	.018	.015	.01
16	60	1.103	.6	.545	.272	.12	.06	.03	.02	.017	.012
20	68.75	1.322	.687	.625	.312	.1375	.069	.035	.023	.019	.013
25	85.94	1.653	.859	.781	.391	.177	.086	.043	.028	.024	.017
32	110	2.115	1.1	1	.5	.222	.11	.055	.036	.031	.023
50	171.55	3.344	1.715	1.563	.781	.367	.172	.086	.057	.046	.034
100	343.75	6.611	3.437	3.125	1.563	.737	.344	.172	.114	.098	.068
150	516.43	9.911	5.156	4.688	2.344	1.083	.516	.258	.172	.147	.103

12~16 CANDLE POWER (60 WATTS) LAMPS ON A 110 VOLT CIRCUIT, REQUIRES  $12 \times .545 = 6.54$  AMPERES;

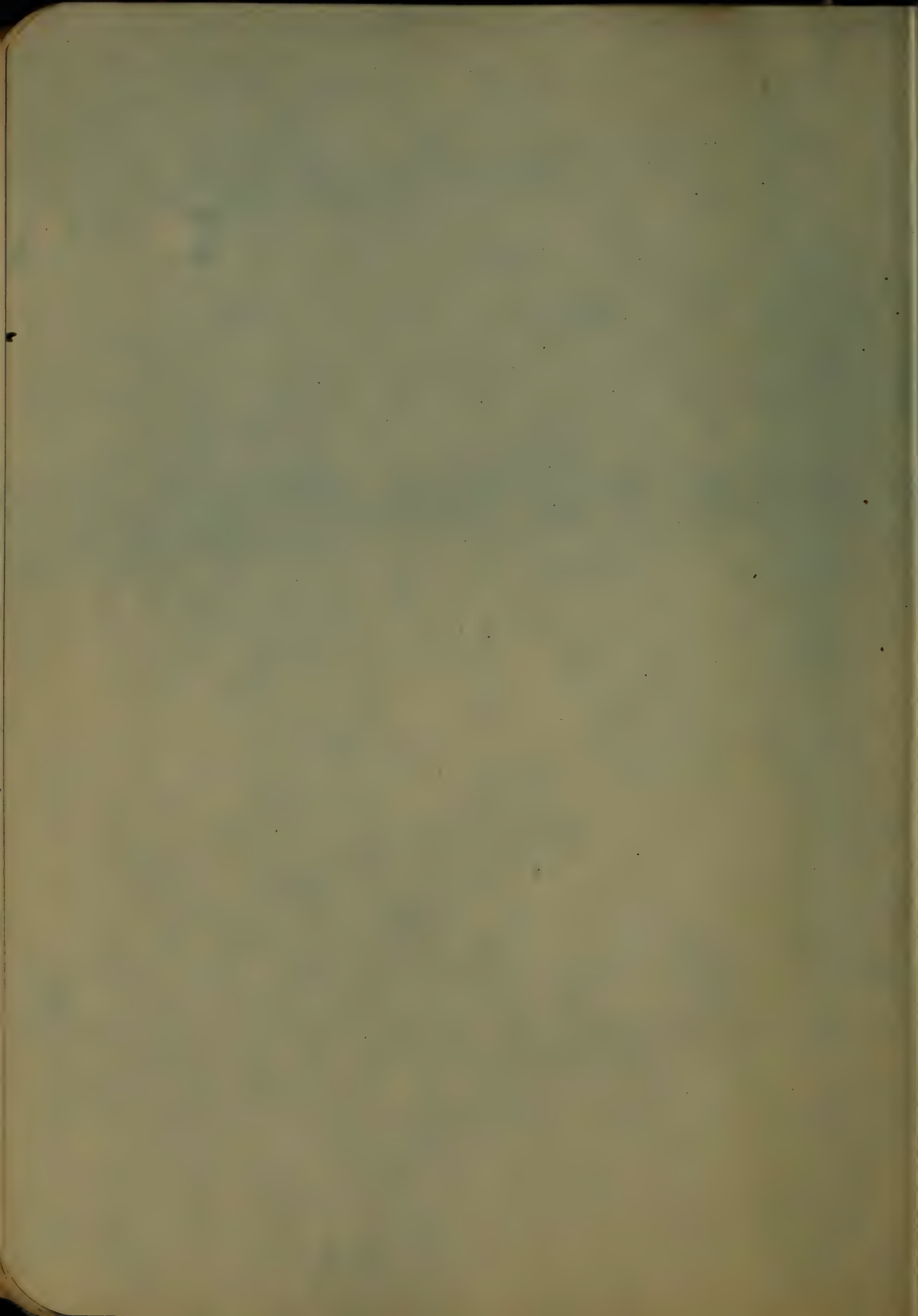
12~16 CANDLE POWER (55 WATTS) LAMPS ON A 110 VOLT CIRCUIT, REQUIRES  $12 \times .5 = 6$  AMPERES; FOR WHICH ACCORDING TO PAGE 192 THE N° 14 OR 15 WIRE IS LARGE ENOUGH.

ON PAGE 197 THE SIZE OF WIRE IS GIVEN FOR THE FEE PER NUMBER OF LAMPS AND A GIVEN DROP IN VOLTS. TO CARRY CURRENT TO 12~16 C.P. LAMPS AT A DISTANCE OF 40 FEET WITH A DROP OF  $1\frac{1}{2}\%$  VOLT LOSS ON A 110 VOLT CIRCUIT, THE WIRE OPPOSITE 12 : 1.5 = 8 IN THE COLUMN FOR 40 FEET WOULD ANSWER THE REQUIREMENT.

FOR THREE-WIRE CIRCUIT USE THE 220 VOLT COLUMN IN FINDING THE SIZE OF THE TWO OUTER WIRES. FOR LINE WIRES THE THIRD OR NEUTRAL WIRE MAY BE FROM  $\frac{1}{4}$  TO  $\frac{1}{2}$  THE AREA OF EACH OF THE OUTER WIRES, WHILE FOR INDOOR WIRING IT IS USUALLY MADE OF THE SAME SIZE, AS EACH OUTER WIRE. FOR INTERCHANGEABLE WIRING THE NEUTRAL WIRE EQUAL IN AREA TO THE SUM OF THE OUTER WIRES, WHICH MAKES THIS SYSTEM CONVERTABLE INTO A PLAIN TWO-WIRE CIRCUIT.









AMPERES PER MOTOR.  
DIRECT CURRENT MOTORS.

WIRE SIZES IN  
B&S GAUGE.

**WIRING FOR MOTOR  
CIRCUITS**  
MINIMUM SIZE OF WIRE  
FOR MOTOR SERVICE, WHEN  
CONSULTED ON PARVEY CO'S LIT.

100 WATT EQUIVALENT	WATTS	NUMBER 16 CANDLE POWER WATT LAMPS
1/2	497	8
3/4	746	15 1/2
1	995	18
1 1/4	1442	27
1 3/4	1865	37 3/4
2	2797	51
2 1/2	3750	68
3	4662	84
3 1/2	6217	113
4	8288	151
5	12435	226
6	16578	302
7	20722	327
8	24866	452
9	33165	603
10	41444	733
12	49733	904
15	58022	1053
20	66311	1204
25	74598	1356
30	82888	1507
35	99455	1808
40	124312	2269
50	154284	2841

## VOLTS AT MOTOR BRUSHES.

50	52	75	100	110	220	400	500	600	800	1000	1200	1500
10	2.56	6.62	4.97	4.52	2.26	1.24	1	.83	.62	.447	.41	.331
14.9	9.94	13.24	6.78	9.04	3.38	1.56	2	1.24	.93	.746	.62	.497
20	13.11	19.8	9.04	13.56	4.52	2.56	3	1.66	1.24	1	.82	.643
24.3	19.8	24.9	13.56	16.95	6.78	3.73	4	2.08	1.86	1.42	1.24	.99
37.5	35.86	34.9	16.95	25.4	8.5	4.7	5	3.1	3.49	1.9	1.6	1.24
50.9	53.8	37.2	25	33.8	16.9	9.3	6	4.6	5.39	2.77	2.3	1.86
74.6	71.7	43.8	33.8	42.8	21.1	11.65	7	6.2	4.66	3.8	3.1	2.53
93.3	89.6	62.1	46.6	56.5	28.2	15.84	8	7.77	5.82	4.66	3.88	3.10
124	120	82.9	62.2	66.5	37.6	20.72	9	10.36	7.77	6.22	5.18	4.14
165	157	110	83	75.3	51.5	31.08	10	13.81	10.36	8.29	6.9	5.52
248	239	165	124	119	76.5	41.44	11	20.72	15.84	12.49	10.36	8.29
331	319	221	166	150	94.1	56.8	12	27.63	20.72	16.97	13.98	11.08
414	399	276	207	188	94.1	62.8	13	34.5	27.63	20.72	17.2	13.81
497	478	331	249	226	113	62	14	41.4	31	24.8	20.72	16.94
663	637	442	332	301	130	82.8	15	55.2	41.4	33.1	27.6	22.1
828	797	562	414	376	188	103	16	69	51.8	41.4	34.5	27.6
994	956	663	497	462	226	124	17	82.8	60	49.7	41.4	33.8
1160	1116	773	580	527	263	145	18	96.7	72.5	58	48.8	38.7
1326	1274	884	663	602	301	165	19	110	82.9	66.3	55.2	44.2
1491	1434	994	746	678	339	186	20	124	93	74.6	62	49.6
1657	1594	1105	829	754	376	207	21	138	103	82.8	69	53.8
1826	1753	1326	904	830	414	248	22	155	124	99	82.8	66.3
2000	1930	1557	1000	910	452	310	23	172	155	124	103	82.8
2174	2092	1756	1093	994	497	335	24	190	172	134	112	89.5

A 10 HORSE POWER MOTOR ON A 220 VOLT CIRCUIT REQUIRES 32.6 AMPERE AT FULL LOAD THAT IS, IT TAKES 8288 WATTS=451 LAMPS.

STANDARD VOLTAGE



# POWER REQUIRED TO DRIVE MACHINE TOOLS.

BELT ON COUNTERSHAFT OR COUNTERSHAFT TO CONE PULLEYS.

NAME AND SIZE OF MACHINE TOOLS.	POWER		COUNTER- SHAFT		REMARKS. MAXIMUM DRILL TAP TURN & TOOL MATERIAL WILL TAKE.
	HORSE POWER	WATTS	SPEED RPM	WIDTH BELT.	
SENSITIVE DRILLS 10" to 14"	$\frac{1}{4}$	248	300-450	12" to 2"	12" to 12" DRILL & HOLE
TWO SPINDLE " " 13" to 14"	$\frac{3}{8}$	372	"	"	"
THREE " " 13"	$\frac{1}{2}$	497	"	"	"
UPRIGHT DRILL PRESS 12" to 20"	$\frac{1}{4}$ to $\frac{1}{2}$	248-497	300-800	12" to 2"	$\frac{1}{2}$ "
" " 21" to 25"	$\frac{1}{2}$ to 2	375-1465	250-250	24" to 3"	$\frac{3}{8}$ " to $1\frac{1}{4}$ "
" " 26" to 40"	$\frac{3}{4}$ to 4	510-730	240-1650	3" to 3"	$1\frac{1}{2}$ " to 2"
RADIAL DRILLS 25" spindle	$\frac{1}{4}$ to $\frac{3}{4}$	248-497	180-220	24" to 3"	$1\frac{1}{2}$ " to 2"
" " 31" to 40"	4 to 8	2750-6000	180-200	3" to 2"	24" to 36"
" " 70" to 80"	6 to 7	4400-10000	110-180	4" to 5"	4" to 5"
GRINDING FLINTS 10" to 15"	$\frac{1}{4}$ to $\frac{1}{2}$	248-497	175-275	3" to 3"	4" to 4" DRILL & HOLE
" " 51"	5 to 6	3750-5500	150-200	3" to 4"	5" to 6"
" " 61"	7	5217	140-190	4"	5" to 6"
" " 73" to 87"	10	8233	125-170	5"	6" to 6" to 7" to 7"
" " 10" to 16"	12 to 15	10585-12455	100-110	"	"
SPEED LATHES	1 to 2	745-1465	250-360	2 3/4"	"
PATTERN MACHINES 12" to 20"	$\frac{1}{4}$ to $\frac{3}{4}$	248-497	400-140	2 1/2" to 4"	"
GRIP LATHES 18" to 18"	$\frac{1}{4}$ to 2	248-1000	160-150	2 1/2" to 3"	"
ENGINE LATHES 18" to 20"	$\frac{1}{4}$ to $\frac{3}{4}$	248-497	400-140	2 1/2" to 4"	1 1/2" to 1 1/2" to 5"
" " 22" to 28"	$\frac{1}{2}$ to 3	2750-2750	120-190	4" to 4"	1 1/2" to 1 1/2" to 7"
" " 36" to 42"	$\frac{3}{4}$ to 4	510-1000	80	4 1/2" to 6"	1 1/2" to 1 1/2" to 7"
" " 48" to 62"	5 to 7 1/2	8233-10000	80	5" to 5 1/2"	2 1/2" to 1"
PIT LATHES 74" to 120"	7 1/2 to 15	10585-12455	180	6"	2 1/2" to 1"
PLANERS 30" to 30" to 47"	3	2797	420	3 1/2" to 1 1/2"	30" to 1
" 34" to 34" to 47"	3 1/2	4843	480	3 1/2" to 1 1/2"	34" to 37 1/2"
" 30" to 30" to 47"	5	4662	350	3 1/2" to 1 1/2"	45" to 1
" 36" to 36" to 47"	6	8894	350	4" to 1 1/2"	45" to 1
" 42" to 42" to 47"	7 1/2	6217	350	4" to 1 1/2"	57" to 1
" 48" to 48" to 47"	10	8888	330	5" to 1 1/2"	75" to 1
" 60" to 60" to 47"	12 1/2	10585	"	6" to 1 1/2"	"
" 72" to 72" to 47"	15	12455	"	6" to 1 1/2"	"
" 10" to 10" to 47"	20	24866	"	6" to 1 1/2"	"
CRANK SHAPER 18" to 21"	$\frac{1}{2}$ to 5	2750-1465	250-300	3" to 5"	"
GORRO 24" to 36"	5 to 7 1/2	4420-6217	230-120	3 1/2" to 4"	"
MILLING MACH. 10" to 24"	5 to 7 1/2	"	160-180	3 1/2" to 5"	"

COARSE  
TOOTH

RECTANGULAR  
TURNING  
TOOLS

RETURN  
WHEEL

RATED DRIVE POWER & BELT





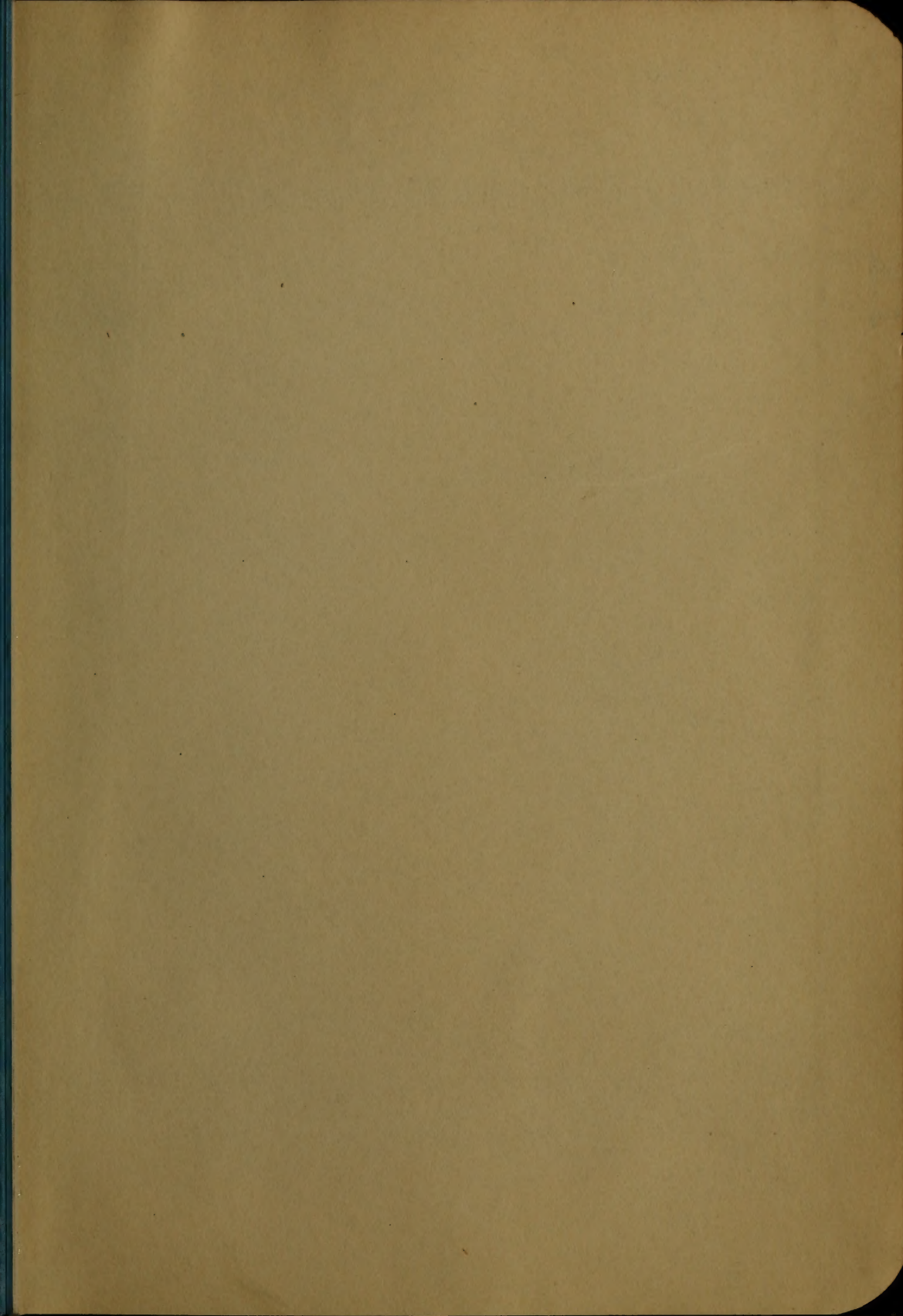


# WAGES SCALE.

## HOURS, DAYS AND WEEK.

10 HOURS WORK A DAY.

10 HOURS WORK A DAY.														DAY OR 10 HOURS
PER WEEK.	HOURS.													
	1/4	1/2	3/4	1	2	3	4	5	6	7	8	9	10	
	DOLLARS AND CENTS.													
2.50	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.11	.12	.13	1.41 1/2
3.00	.01	.02	.04	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.50
3.50	.01	.03	.04	.06	.12	.17	.23	.29	.35	.41	.47	.53	.58	.58 1/2
4.00	.02	.05	.05	.07	.13	.20	.27	.33	.40	.47	.53	.60	.66 1/2	.66 1/2
4.50	.02	.04	.05	.07	.15	.23	.30	.37	.45	.52	.60	.67	.75	.75
5.00	.02	.04	.06	.08	.17	.25	.33	.42	.50	.58	.67	.75	.83 1/2	.83 1/2
5.50	.02	.05	.07	.09	.18	.27	.37	.46	.56	.64	.73	.82	.91 1/2	.91 1/2
6.00	.02	.05	.07	.10	.20	.30	.40	.50	.60	.70	.80	.90	1.00	1.00
6.50	.02	.05	.08	.11	.22	.33	.43	.54	.65	.76	.87	.97	1.08 1/2	1.08 1/2
7.00	.03	.06	.09	.12	.23	.35	.47	.58	.70	.82	.93	1.05	1.16 1/2	1.16 1/2
7.50	.03	.06	.09	.12	.25	.37	.50	.62	.75	.87	1.00	1.12	1.25	1.25
8.00	.03	.07	.10	.13	.27	.40	.53	.67	.80	.92	1.07	1.20	1.33 1/2	1.33 1/2
8.50	.04	.07	.11	.14	.28	.42	.57	.71	.85	.99	1.13	1.27	1.41 1/2	1.41 1/2
9.00	.04	.07	.11	.15	.30	.45	.60	.75	.90	1.05	1.20	1.35	1.50	1.50
9.50	.04	.08	.12	.16	.32	.47	.63	.79	.95	1.11	1.27	1.42	1.58 1/2	1.58 1/2
10.00	.04	.09	.13	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.66 1/2	1.66 1/2
10.50	.04	.09	.13	.17	.35	.52	.70	.87	1.05	1.22	1.40	1.57	1.75	1.75
11.00	.05	.09	.14	.18	.37	.55	.73	.92	1.10	1.28	1.47	1.65	1.83 1/2	1.83 1/2
11.50	.05	.10	.14	.19	.38	.57	.77	.96	1.15	1.34	1.53	1.72	1.91 1/2	1.91 1/2
12.00	.05	.10	.15	.20	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00	2.00
12.50	.05	.10	.16	.21	.42	.62	.83	1.04	1.25	1.46	1.67	1.87	2.08 1/2	2.08 1/2
13.00	.05	.11	.16	.22	.43	.65	.87	1.08	1.30	1.52	1.73	1.95	2.16 1/2	2.16 1/2
13.50	.06	.11	.17	.22	.45	.67	.90	1.12	1.35	1.57	1.80	2.02	2.25	2.25
14.00	.06	.12	.17	.23	.47	.70	.93	1.17	1.40	1.63	1.87	2.10	2.33 1/2	2.33 1/2
14.50	.06	.12	.18	.24	.49	.72	.97	1.21	1.45	1.69	1.93	2.17	2.41 1/2	2.41 1/2
15.00	.06	.12	.19	.25	.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.50
15.50	.06	.13	.19	.26	.52	.77	1.03	1.29	1.55	1.81	2.07	2.33	2.58 1/2	2.58 1/2
16.00	.07	.13	.20	.27	.53	.80	1.07	1.33	1.60	1.87	2.13	2.40	2.66 1/2	2.66 1/2
16.50	.07	.14	.21	.27	.55	.82	1.10	1.37	1.65	1.92	2.20	2.47	2.75	2.75
17.00	.07	.14	.21	.28	.56	.83	1.13	1.41	1.70	1.98	2.27	2.55	2.83 1/2	2.83 1/2
17.50	.07	.15	.22	.30	.58	.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.00
18.00	.08	.16	.23	.31	.60	.95	1.25	1.55	1.90	2.25	2.55	2.85	3.15 1/2	3.15 1/2
18.50	.08	.17	.24	.33	.61	1.00	1.33	1.65	2.00	2.35	2.65	3.00	3.31 1/2	3.31 1/2
19.00	.08	.17	.24	.33	.62	1.00	1.33	1.65	2.00	2.35	2.65	3.00	3.31 1/2	3.31 1/2
20.00	.10	.20	.30	.40	.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.00
25.00	.10	.21	.32	.41	.85	1.25	1.66	2.08	2.50	2.91	3.40	3.85	4.31 1/2	4.31 1/2





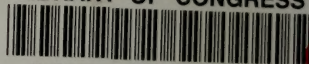
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